Pine Chemicals Association
February 2005

VII. Robust Summaries of Data for Rosin Esters

PHYSICO-CHEMICAL PROPERTY – WATER SOLUBILITY	
Test Substance	
Chemical Name	Rosin, pentaerythritol ester
CAS #	8050-26-8
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 105, *Water Solubility*
Test Type	Water solubility
GLP (Y/N)	Y
Year (Study Performed)	2003
Test conditions	Rosin, pentaerythritol ester was tested for water solubility by weighing 0.5 g of the test item into an Erlenmeyer flask and adding 150 ml of Milli-Q water. Samples were prepared in triplicate. The flasks were then shaken orbitally at 150 rpm at 30 °C ± °C for 72 h. A Milli-Q water blank was prepared in the same manner, without test material. At the end of the shaking period, the flasks were transferred to a water bath at 20 °C ± °C for 24 h. The pH of the water was recorded prior to addition of the test material and at the end of the incubation period. The samples were then filtered if appropriate to remove undissolved material and allowed to sit overnight at ambient laboratory temperature. Approximately 150 ml of the test sample was centrifuged and the supernatant extracted 3 times with ethyl acetate. The combined extracts were taken to dryness under nitrogen, reconstituted in tetrohydrofuran, vortex mixed and sonicated in an ultrasonic bath. Samples were assayed by gel permeation chromatography (GPC) using refractive index (RI) detection.
Results	The water solubility of rosin, pentaerythritol ester is 0.38 mg/l at 20 °C.
Data Quality	Reliable without restrictions – Klimisch Code 1a
References	Dinwoodie, N.B. 2003. Determination of the Water Solubility of Rosins, Rosin Salts, Rosin Adducts, Adduct Salts and Rosin Esters Report No. 24028, Inveresk Research, Tranent, Scotland.

PHYSICO-CHEMICAL PROPERTY – WATER SOLUBILITY	
Test Substance	
Chemical Name	Rosin, glycerol ester
CAS #	8050-31-5
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 105, *Water Solubility*
Test Type	Water solubility
GLP (Y/N)	Y
Year (Study Performed)	2003

Test conditions	Rosin, glycerol ester was tested for water solubility by weighing 0.5 g of the test item into an Erlenmeyer flask and adding 150 ml of Milli-Q water. Samples were prepared in triplicate. The flasks were then shaken orbitally at 150 rpm at 30 ^{o}C ± ^{o}C for 72 h. A Milli-Q water blank was prepared in the same manner, without test material. At the end of the shaking period, the flasks were transferred to a water bath at 20 ^{o}C ± ^{o}C for 24 h. The pH of the water was recorded prior to addition of the test material and at the end of the incubation period. The samples were then filtered if appropriate to remove undissolved material and allowed to sit overnight at ambient laboratory temperature. Approximately 150 ml of the test sample was centrifuged and the supernatant extracted 3 times with ethyl acetate. The combined extracts were taken to dryness under nitrogen, reconstituted in tetrohydrofuran, vortex mixed and sonicated in an ultrasonic bath. Samples were assayed by gel permeation chromatography (GPC) using refractive index (RI) detection.
Results	The water solubility of rosin, pentaerythritol ester is < 0.4 mg/l at 20 ^{0}C.
Data Quality	Reliable without restrictions – Klimisch Code 1a
References	Dinwoodie, N.B. 2003. Determination of the Water Solubility of Rosins, Rosin Salts, Rosin Adducts, Adduct Salts and Rosin Esters Report No. 24028, Inveresk Research, Tranent, Scotland.

PHYSICO-CHEMICAL PROPERTY – WATER SOLUBILITY	
Test Substance	
Chemical Name	Rosin, diethylene glycol ester
CAS #	68153-38-8
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 105, *Water Solubility*
Test Type	Water solubility
GLP (Y/N)	Y
Year (Study Performed)	2003
Test conditions	Rosin, diethylene glycol ester was tested for water solubility by weighing 0.5 g of the test item into an Erlenmeyer flask and adding 150 ml of Milli-Q water. Samples were prepared in triplicate. The flasks were then shaken orbitally at 150 rpm at 30 ^{o}C ± ^{o}C for 72 h. A Milli-Q water blank was prepared in the same manner, without test material. At the end of the shaking period, the flasks were transferred to a water bath at 20 ^{o}C ± ^{o}C for 24 h. The pH of the water was recorded prior to addition of the test material and at the end of the incubation period. The samples were then filtered if appropriate to remove undissolved material and allowed to sit overnight at ambient laboratory temperature. Approximately 150 ml of the test sample was centrifuged and the supernatant extracted 3 times with ethyl acetate. The combined extracts were taken to dryness under nitrogen, reconstituted in tetrohydrofuran, vortex mixed and sonicated in an ultrasonic bath. Samples were assayed by gel permeation chromatography (GPC) using refractive index (RI) detection.

Results	The water solubility of rosin, diethylene glycol ester is 2.38 mg/l at 20 ^{0}C.
Data Quality	Reliable without restrictions – Klimisch Code 1a
References	Dinwoodie, N.B. 2003. Determination of the Water Solubility of Rosins, Rosin Salts, Rosin Adducts, Adduct Salts and Rosin Esters Report No. 24028, Inveresk Research, Tranent, Scotland.

PHYSICO-CHEMICAL PROPERTY – WATER SOLUBILITY	
Test Substance	
Chemical Name	Rosin, methyl ester
CAS #	68186-14-1
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 105, *Water Solubility*
Test Type	Water solubility
GLP (Y/N)	Y
Year (Study Performed)	2003
Test conditions	Rosin, methyl ester was tested for water solubility by weighing 0.5 g of the test item into an Erlenmeyer flask and adding 150 ml of Milli-Q water. Samples were prepared in triplicate. The flasks were then shaken orbitally at 150 rpm at 30 ^{o}C ± ^{o}C for 72 h. A Milli-Q water blank was prepared in the same manner, without test material. At the end of the shaking period, the flasks were transferred to a water bath at 20 ^{o}C ± ^{o}C for 24 h. The pH of the water was recorded prior to addition of the test material and at the end of the incubation period. The samples were then filtered if appropriate to remove undissolved material and allowed to sit overnight at ambient laboratory temperature. Approximately 150 ml of the test sample was centrifuged and the supernatant extracted 3 times with ethyl acetate. The combined extracts were taken to dryness under nitrogen, reconstituted in tetrohydrofuran, vortex mixed and sonicated in an ultrasonic bath. Samples were assayed by gel permeation chromatography (GPC) using refractive index (RI) detection.
Results	The water solubility of rosin, methyl ester is 5.2 mg/l at 20 ^{0}C.
Data Quality	Reliable without restrictions – Klimisch Code 1a
References	Dinwoodie, N.B. 2003. Determination of the Water Solubility of Rosins, Rosin Salts, Rosin Adducts, Adduct Salts and Rosin Esters Report No. 24028, Inveresk Research, Tranent, Scotland.

PHYSICO-CHEMICAL PROPERTY – WATER SOLUBILITY	
Test Substance	
Chemical Name	Rosin, hydrogenated, glycerol ester
CAS #	65997-13-9
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 105, *Water Solubility*
Test Type	Water solubility

GLP (Y/N)	Y
Year (Study Performed)	2003
Test conditions	Rosin, hydrogenated, glycerol ester was tested for water solubility by weighing 0.5 g of the test item into an Erlenmeyer flask and adding 150 ml of Milli-Q water. Samples were prepared in triplicate. The flasks were then shaken orbitally at 150 rpm at 30 ^{o}C ± ^{o}C for 72 h. A Milli-Q water blank was prepared in the same manner, without test material. At the end of the shaking period, the flasks were transferred to a water bath at 20 ^{o}C ± ^{o}C for 24 h. The pH of the water was recorded prior to addition of the test material and at the end of the incubation period. The samples were then filtered if appropriate to remove undissolved material and allowed to sit overnight at ambient laboratory temperature. Approximately 150 ml of the test sample was centrifuged and the supernatant extracted 3 times with ethyl acetate. The combined extracts were taken to dryness under nitrogen, reconstituted in tetrohydrofuran, vortex mixed and sonicated in an ultrasonic bath. Samples were assayed by gel permeation chromatography (GPC) using refractive index (RI) detection.
Results	The water solubility of rosin, hydrogenated glycerol ester is 0.15 mg/l at 20 ^{0}C.
Data Quality	Reliable without restrictions – Klimisch Code 1a
References	Dinwoodie, N.B. 2003. Determination of the Water Solubility of Rosins, Rosin Salts, Rosin Adducts, Adduct Salts and Rosin Esters Report No. 24028, Inveresk Research, Tranent, Scotland.

PHYSICO-CHEMICAL PROPERTY – WATER SOLUBILITY	
Test Substance	
Chemical Name	Rosin, hydrogenated, pentaerythritol ester
CAS #	64365-17-9
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 105, *Water Solubility*
Test Type	Water solubility
GLP (Y/N)	Y
Year (Study Performed)	2003
Test conditions	Rosin, hydrogenated, pentaerythritol ester was tested for water solubility by weighing 0.5 g of the test item into an Erlenmeyer flask and adding 150 ml of Milli-Q water. Samples were prepared in triplicate. The flasks were then shaken orbitally at 150 rpm at 30 ^{o}C ± ^{o}C for 72 h. A Milli-Q water blank was prepared in the same manner, without test material. At the end of the shaking period, the flasks were transferred to a water bath at 20 ^{o}C ± ^{o}C for 24 h. The pH of the water was recorded prior to addition of the test material and at the end of the incubation period. The samples were then filtered if appropriate to remove undissolved material and allowed to sit overnight at ambient laboratory temperature. Approximately 150 ml of the test sample was centrifuged and the supernatant extracted 3 times with ethyl acetate. The combined extracts were taken to dryness under nitrogen, reconstituted in tetrohydrofuran, vortex mixed and sonicated in an ultrasonic bath.

	Samples were assayed by gel permeation chromatography (GPC) using refractive index (RI) detection.
Results	The water solubility of rosin, hydrogenated glycerol ester is < 0.22 mg/l at 20 ^{0}C.
Data Quality	Reliable without restrictions – Klimisch Code 1a
References	Dinwoodie, N.B. 2003. Determination of the Water Solubility of Rosins, Rosin Salts, Rosin Adducts, Adduct Salts and Rosin Esters Report No. 24028, Inveresk Research, Tranent, Scotland.

PHYSICO-CHEMICAL PROPERTY – WATER SOLUBILITY	
Test Substance	
Chemical Name	Rosin, partially hydrogenated, methyl ester
CAS #	8050-15-5
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 105, *Water Solubility*
Test Type	Water solubility
GLP (Y/N)	Y
Year (Study Performed)	2003
Test conditions	Rosin, partially hydrogenated, methyl ester was tested for water solubility by weighing 0.5 g of the test item into an Erlenmeyer flask and adding 150 ml of Milli-Q water. Samples were prepared in triplicate. The flasks were then shaken orbitally at 150 rpm at 30 ^{o}C ± ^{o}C for 72 h. A Milli-Q water blank was prepared in the same manner, without test material. At the end of the shaking period, the flasks were transferred to a water bath at 20 ^{o}C ± ^{o}C for 24 h. The pH of the water was recorded prior to addition of the test material and at the end of the incubation period. The samples were then filtered if appropriate to remove undissolved material and allowed to sit overnight at ambient laboratory temperature. Approximately 150 ml of the test sample was centrifuged and the supernatant extracted 3 times with ethyl acetate. The combined extracts were taken to dryness under nitrogen, reconstituted in tetrohydrofuran, vortex mixed and sonicated in an ultrasonic bath. Samples were assayed by gel permeation chromatography (GPC) using refractive index (RI) detection.
Results	The water solubility of rosin, partially hydrogenated methyl ester is 2.1 mg/l at 20 ^{0}C.
Data Quality	Reliable without restrictions – Klimisch Code 1a
References	Dinwoodie, N.B. 2003. Determination of the Water Solubility of Rosins, Rosin Salts, Rosin Adducts, Adduct Salts and Rosin Esters Report No. 24028, Inveresk Research, Tranent, Scotland.

PHYSICO-CHEMICAL PROPERTY – OCTANOL/WATER PARTITION COEFFICIENT	
Test Substance	
Chemical Name	Pentaerythritol Ester of Rosin
CAS #	8050-26-8
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 117, "Partition Coefficient (n-Octanol/Water) High Performance Liquid

	Chromatograph (HPLC) Method."
Test Type	Partition coefficient
GLP (Y/N)	Y
Year (Study Performed)	1993
Test conditions	Pentaerythritol ester of rosin was dissolved in methanol and the solution was analyzed by HPLC with UV detection using a mobile phase of methanol:buffer (3:1) at pH 2 and pH 7.5. As a reference substance, a mixture of seven materials was used.
Results	At pH 2, the log P_{ow} values of two components in pentaerythritol ester of rosin were 6.1 and 7.1. At pH 7.5, the log P_{ow} value of one component in pentaerythritol ester of rosin was 3.6.
Data Quality	Reliable without restrictions – Klimisch Code 1a
References	Dybdahl, H.P. 1993. Determination of log Pow for single components in pentaerythritol ester of rosin. GLP Study No. 408335/477. Water Quality Institute, Horsholm, Denmark.

PHYSICO-CHEMICAL PROPERTY – OCTANOL/WATER PARTITION COEFFICIENT	
Test Substance	
Chemical Name	Glycerol Ester of Rosin
CAS #	8050-31-5
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 117, "Partition Coefficient (n-Octanol/Water) High Performance Liquid Chromatograph (HPLC) Method."
Test Type	Partition coefficient
GLP (Y/N)	Y
Year (Study Performed)	1993
Test conditions	Glyercol ester of rosin was dissolved in methanol and the solution was analyzed by HPLC with UV detection using a mobile phase of methanol:buffer (3:1) at pH 2 and pH 7.5. As a reference substance, a mixture of seven materials was used.
Results	At pH 2, no log P_{ow} values > 1.5 in glycerol ester of rosin were detected. At pH 7.5, no log P_{ow} values > 1.5 in glycerol ester of rosin were detected.
Data Quality	Reliable without restrictions – Klimisch Code 1a
References	Dybdahl, H.P. 1993. Determination of log Pow for single substances in glycerol ester of rosin. GLP Study No. 408335/478. Water Quality Institute, Horsholm, Denmark.

PHYSICO-CHEMICAL PROPERTY – OCTANOL/WATER PARTITION COEFFICIENT	
Test Substance	
Chemical Name	Rosin, diethylene glycol ester
CAS #	68153-38-8
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 117, *"Partition Coefficient (n-Octanol/Water) High Performance Liquid Chromatograph (HPLC) Method"*
Test Type	Partition coefficient
GLP (Y/N)	Y
Year (Study Performed)	2003
Test conditions	Rosin, diethylene glycol ester and reference materials were dissolved in methanol and the solutions were analyzed in

	duplicate by HPLC with Refractive Index (RI) and Photodiode Array (PDA) detection using a mobile phase of 25:75 (v/v) Milli-Q water/methanol at pH 2. A mixture of seven materials with known log P_{ow} values was used for reference.
Results	At pH 2, rosin, diethylene glycol ester had a partition coefficient range of 4 to 5.8.
Data Quality	Reliable without restrictions – Klimisch Code 1a
Reference	Lightbody, S.M., Fisher, K. and Dinwoodie, N.B. 2003. Determination of the Partition Coefficient of Rosins, Rosin Salts, Rosin Adducts, Adduct Salts and Rosin Esters. Report No. 20977. Inveresk Research, Tranent, Scotland.

PHYSICO-CHEMICAL PROPERTY – OCTANOL/WATER PARTITION COEFFICIENT	
Test Substance	
Chemical Name	Rosin, methyl ester
CAS #	68186-14-1
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 117, *"Partition Coefficient (n-Octanol/Water) High Performance Liquid Chromatograph (HPLC) Method"*
Test Type	Partition coefficient
GLP (Y/N)	Y
Year (Study Performed)	2003
Test conditions	Rosin, methyl ester and reference materials were dissolved in methanol and the solutions were analyzed in duplicate by HPLC with Refractive Index (RI) and Photodiode Array (PDA) detection using a mobile phase of 25:75 (v/v) Milli-Q water/methanol at pH 2. A mixture of seven materials with known log P_{ow} values was used for reference.
Results	At pH 2, rosin, methyl ester had a partition coefficient range of 4.9 to 7.6.
Data Quality	Reliable without restrictions – Klimisch Code 1a
Reference	Lightbody, S.M., Fisher, K. and Dinwoodie, N.B. 2003. Determination of the Partition Coefficient of Rosins, Rosin Salts, Rosin Adducts, Adduct Salts and Rosin Esters. Report No. 20977. Inveresk Research, Tranent, Scotland.

PHYSICO-CHEMICAL PROPERTY – OCTANOL/WATER PARTITION COEFFICIENT	
Test Substance	
Chemical Name	Rosin, hydrogenated glycerol ester
CAS #	65997-13-9
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 117, *"Partition Coefficient (n-Octanol/Water) High Performance Liquid Chromatograph (HPLC) Method"*
Test Type	Partition coefficient
GLP (Y/N)	Y
Year (Study Performed)	2003
Test conditions	Rosin, hydrogenated glycerol ester and reference materials were dissolved in methanol and the solutions were analyzed in duplicate by HPLC with Refractive Index (RI) and Photodiode Array (PDA) detection using a mobile phase of 25:75 (v/v) Milli-Q

	water/methanol at pH 2. A mixture of seven materials with known log P_{ow} values was used for reference.
Results	At pH 2, rosin, hydrogenated glycerol ester had a partition coefficient range of 4.7 to 5.8.
Data Quality	Reliable without restrictions – Klimisch Code 1a
Reference	Lightbody, S.M., Fisher, K. and Dinwoodie, N.B. 2003. Determination of the Partition Coefficient of Rosins, Rosin Salts, Rosin Adducts, Adduct Salts and Rosin Esters. Report No. 20977. Inveresk Research, Tranent, Scotland.

PHYSICO-CHEMICAL PROPERTY – OCTANOL/WATER PARTITION COEFFICIENT	
Test Substance	
Chemical Name	Rosin, hydrogenated pentaerythritol ester
CAS #	64365-17-9
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 117, *"Partition Coefficient (n-Octanol/Water) High Performance Liquid Chromatograph (HPLC) Method"*
Test Type	Partition coefficient
GLP (Y/N)	Y
Year (Study Performed)	2003
Test conditions	Rosin, hydrogenated pentaerythritol ester and reference materials were dissolved in methanol and the solutions were analyzed in duplicate by HPLC with Refractive Index (RI) and Photodiode Array (PDA) detection using a mobile phase of 25:75 (v/v) Milli-Q water/methanol at pH 2. A mixture of seven materials with known log P_{ow} values was used for reference.
Results	At pH 2, rosin, hydrogenated pentaerythritol ester had a partition coefficient range of 4.6 to 7.3.
Data Quality	Reliable without restrictions – Klimisch Code 1a
Reference	Lightbody, S.M., Fisher, K. and Dinwoodie, N.B. 2003. Determination of the Partition Coefficient of Rosins, Rosin Salts, Rosin Adducts, Adduct Salts and Rosin Esters. Report No. 20977. Inveresk Research, Tranent, Scotland.

PHYSICO-CHEMICAL PROPERTY – OCTANOL/WATER PARTITION COEFFICIENT	
Test Substance	
Chemical Name	Rosin, partially hydrogenated methyl ester
CAS #	8050-15-5
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 117, *"Partition Coefficient (n-Octanol/Water) High Performance Liquid Chromatograph (HPLC) Method"*
Test Type	Partition coefficient
GLP (Y/N)	Y
Year (Study Performed)	2003
Test conditions	Rosin, partially hydrogenated methyl ester and reference materials were dissolved in methanol and the solutions were analyzed in duplicate by HPLC with Refractive Index (RI) and Photodiode Array (PDA) detection using a mobile phase of 25:75 (v/v) Milli-Q water/methanol at pH 2. A mixture of seven materials with known log P_{ow} values was used for reference.

Results	At pH 2, rosin, partially hydrogenated methyl ester had a partition coefficient range of 6.4 to 7.6.
Data Quality	Reliable without restrictions – Klimisch Code 1a
Reference	Lightbody, S.M., Fisher, K. and Dinwoodie, N.B. 2003. Determination of the Partition Coefficient of Rosins, Rosin Salts, Rosin Adducts, Adduct Salts and Rosin Esters. Report No. 20977. Inveresk Research, Tranent, Scotland.

ENVIRONMENTAL FATE – BIODEGRADATION	
Test Substance	
Chemical Name	Rosin, pentaerythritol ester
CAS #	8050-26-8
Method	
Method/Guideline followed	Testing was conducted according to OECD (1992) 301B *Modified Sturm Test*
Test Type (aerobic/anaerobic)	Aerobic
GLP (Y/N)	Y
Year (Study Performed)	2002
Contact time	28 days
Inoculum	Activated sludge from the Haddington Municipal Sewage Treatment Works
Test conditions	Inoculum: Activated sludge microorganisms were obtained from the Haddington Municipal Sewage Treatment Works. The solids content of the sludge was 3.2 g/l. Concentration of test chemical: The test material was used at a concentration of 20 mg DOC/L. Based on the percentage carbon content, a target weight of 51.31 mg of test material was weighed for direct addition to each appropriate bioreactor. Test Setup: Each test item bioreactor contained 1980 ml of mineral media, 20 ml of microbial inoculum and 54 mg of test item. The reference bioreactor contained 1911 ml of mineral media, 20 ml of microbial inoculum and 69 ml of reference material (sodium benzoate) stock. The control bioreactors each contained 1980 ml of mineral media and 20 ml of microbial inoculum. The toxicity control bioreactor contained 1911 ml of mineral media, 20 ml of microbial inoculum, 53.9 mg of test item and 69 ml reference material stock. Each bioreactor was connected to three traps, each trap containing 100 ml of 0.0125 M $Ba(OH)_2$. At trap collection, the trap closes to the bioreactor was taken for titration, the two remaining traps were moved closer to the bioreactor and a fresh trap was placed third in line from the bioreactor. Trap changes were conducted on days 1, 4, 6, 8, 11, 15, 18, 21, 25, and 29. Each sampled trap was titrated with a few drops of phenolphthalein indicator against 0.05M HCl. The pH was determined in each bioreactor on days 0, 28 and 29; if necessary, the pH on day 0 was adjusted to 7.2-7.8.

	Calculation of Results: The weight of CO_2 evolved was calculated from the titre. The actual titre for each batch of $Ba(OH)_2$ was used as the background titre. The mean titre for the test, reference and control vessels was calculated according to the following equation: Weight CO_2 produced (mg) = 1.1 x (background titre – ml HCl titrated) The net CO_2 production was then calculated by subtracting the control mean CO_2 production from the test and reference material mean CO_2 production values. The percentage biodegradation was calculated by comparing actual CO_2 evolved in test and reference vessels with the theoretical CO_2 evolution. For the test item this was calculated using the DOC addition rate: $\% \text{ degradation} = \frac{\text{Mg } CO_2 \text{ produced}}{\text{mg DOC added} \times 3.67^{*}} \times 100$ * = where 3.67 is the conversion factor (44/12) for carbon to CO_2
Results Degradation % after time	0.0% after 28 days (test article); 60.3% after 28 days (sodium benzoate)
Conclusions	The test article was degraded 0 % after 28 days. Under the conditions of the OECD guidelines, it cannot be considered to be readily biodegradable.
Data Quality	Reliable without restrictions– Klimisch Code 1a
Reference	Kelly, C.R. 2002. Rosin, esters with pentaerythritol, CAS No. 8050-26-8; Rosin, esters with glycerol, CAS No. 8050-31-5; Rosin, esters with diethylene glycol, CAS No. 68153-38-8; Rosin, methyl esters, CAS No. 68186-14-1; Rosin, hydrogenated, esters with pentaerythritol, CAS No. 64365-17-9; Rosin, hydrogenated, glycerol ester, CAS No. 65997-13-9; Determination of Ready Biodegradability by the Modified Sturm Test. Report No. 21732. Inveresk Research, Tranet, Scotland.

ENVIRONMENTAL FATE – BIODEGRADATION	
Test Substance	
Chemical Name	Rosin, glycerol ester
CAS #	8050-31-5
Method	
Method/Guideline followed	Testing was conducted according to OECD (1992) 301B *Modified Sturm Test*
Test Type (aerobic/anaerobic)	Aerobic
GLP (Y/N)	Y
Year (Study Performed)	2002
Contact time	28 days
Inoculum	Activated sludge from the Haddington Municipal Sewage Treatment Works
Test conditions	Inoculum: Activated sludge microorganisms were obtained from

	the Haddington Municipal Sewage Treatment Works. The solids content of the sludge was 3.2 g/l. Concentration of test chemical: The test material was used at a concentration of 20 mg DOC/L. Based on the percentage carbon content, a target weight of 51.31 mg of test material was weighed for direct addition to each appropriate bioreactor. Test Setup: Each test item bioreactor contained 1980 ml of mineral media, 20 ml of microbial inoculum and 54 mg of test item. The reference bioreactor contained 1911 ml of mineral media, 20 ml of microbial inoculum and 69 ml of reference material (sodium benzoate) stock. The control bioreactors each contained 1980 ml of mineral media and 20 ml of microbial inoculum. The toxicity control bioreactor contained 1911 ml of mineral media, 20 ml of microbial inoculum, 53.9 mg of test item and 69 ml reference material stock. Each bioreactor was connected to three traps, each trap containing 100 ml of 0.0125 M $Ba(OH)_2$. At trap collection, the trap closes to the bioreactor was taken for titration, the two remaining traps were moved closer to the bioreactor and a fresh trap was placed third in line from the bioreactor. Trap changes were conducted on days 1, 4, 6, 8, 11, 15, 18, 21, 25, and 29. Each sampled trap was titrated with a few drops of phenolphthalein indicator against 0.05M HCl. The pH was determined in each bioreactor on days 0, 28 and 29; if necessary, the pH on day 0 was adjusted to 7.2-7.8. Calculation of Results: The weight of CO_2 evolved was calculated from the titre. The actual titre for each batch of $Ba(OH)_2$ was used as the background titre. The mean titre for the test, reference and control vessels was calculated according to the following equation: Weight CO_2 produced (mg) = 1.1 x (background titre – ml HCl titrated) The net CO_2 production was then calculated by subtracting the control mean CO_2 production from the test and reference material mean CO_2 production values. The percentage biodegradation was calculated by comparing actual CO_2 evolved in test and reference vessels with the theoretical CO_2 evolution. For the test item this was calculated using the DOC addition rate: $$\% \text{ degradation} = \frac{\text{Mg } CO_2 \text{ produced}}{\text{mg DOC added} \times 3.67^{*}} \times 100$$ * = where 3.67 is the conversion factor (44/12) for carbon to CO_2
Results Degradation % after time	0.0% after 28 days (test article); 60.3% after 28 days (sodium benzoate)
Conclusions	The test article was degraded 0 % after 28 days. Under the conditions of the OECD guidelines, it cannot be considered to be

	readily biodegradable.
Data Quality	Reliable without restrictions– Klimisch Code 1a
Reference	Kelly, C.R. 2002. Rosin, esters with pentaerythritol, CAS No. 8050-26-8; Rosin, esters with glycerol, CAS No. 8050-31-5; Rosin, esters with diethylene glycol, CAS No. 68153-38-8; Rosin, methyl esters, CAS No. 68186-14-1; Rosin, hydrogenated, esters with pentaerythritol, CAS No. 64365-17-9; Rosin, hydrogenated, glycerol ester, CAS No. 65997-13-9; Determination of Ready Biodegradability by the Modified Sturm Test. Report No. 21732. Inveresk Research, Tranet, Scotland.

ENVIRONMENTAL FATE – BIODEGRADATION	
Test Substance	
Chemical Name	Rosin, diethylene glycol ester
CAS #	68153-38-8
Method	
Method/Guideline followed	Testing was conducted according to OECD (1992) 301B *Modified Sturm Test*
Test Type (aerobic/anaerobic)	Aerobic
GLP (Y/N)	Y
Year (Study Performed)	2002
Contact time	28 days
Inoculum	Activated sludge from the Haddington Municipal Sewage Treatment Works
Test conditions	Inoculum: Activated sludge microorganisms were obtained from the Haddington Municipal Sewage Treatment Works. The solids content of the sludge was 3.2 g/l. Concentration of test chemical: The test material was used at a concentration of 20 mg DOC/L. Based on the percentage carbon content, a target weight of 51.31 mg of test material was weighed for direct addition to each appropriate bioreactor. Test Setup: Each test item bioreactor contained 1980 ml of mineral media, 20 ml of microbial inoculum and 54 mg of test item. The reference bioreactor contained 1911 ml of mineral media, 20 ml of microbial inoculum and 69 ml of reference material (sodium benzoate) stock. The control bioreactors each contained 1980 ml of mineral media and 20 ml of microbial inoculum. The toxicity control bioreactor contained 1911 ml of mineral media, 20 ml of microbial inoculum, 53.9 mg of test item and 69 ml reference material stock. Each bioreactor was connected to three traps, each trap containing 100 ml of 0.0125 M $Ba(OH)_2$. At trap collection, the trap closes to the bioreactor was taken for titration, the two remaining traps were moved closer to the bioreactor and a fresh trap was placed third in line from the bioreactor. Trap changes were conducted on days 1, 4, 6, 8, 11, 15, 18, 21, 25, and 29. Each sampled trap was titrated with a few drops of phenolphthalein indicator against 0.05M HCl. The pH was

	determined in each bioreactor on days 0, 28 and 29; if necessary, the pH on day 0 was adjusted to 7.2-7.8. Calculation of Results: The weight of CO_2 evolved was calculated from the titre. The actual titre for each batch of $Ba(OH)_2$ was used as the background titre. The mean titre for the test, reference and control vessels was calculated according to the following equation: Weight CO_2 produced (mg) = 1.1 x (background titre – ml HCl titrated) The net CO_2 production was then calculated by subtracting the control mean CO_2 production from the test and reference material mean CO_2 production values. The percentage biodegradation was calculated by comparing actual CO_2 evolved in test and reference vessels with the theoretical CO_2 evolution. For the test item this was calculated using the DOC addition rate: $\% \text{ degradation} = \frac{\text{Mg } CO_2 \text{ produced}}{\text{mg DOC added} \times 3.67^{*}} \times 100$ * = where 3.67 is the conversion factor (44/12) for carbon to CO_2
Results Degradation % after time	19.7% after 28 days (test article); 86.6% after 28 days (sodium benzoate)
Conclusions	The test article was degraded 19.7 % after 28 days. Under the conditions of the OECD guidelines, it cannot be considered to be readily biodegradable.
Data Quality	Reliable without restrictions– Klimisch Code 1a
Reference	Kelly, C.R. 2002. Rosin, esters with pentaerythritol, CAS No. 8050-26-8; Rosin, esters with glycerol, CAS No. 8050-31-5; Rosin, esters with diethylene glycol, CAS No. 68153-38-8; Rosin, methyl esters, CAS No. 68186-14-1; Rosin, hydrogenated, esters with pentaerythritol, CAS No. 64365-17-9; Rosin, hydrogenated, glycerol ester, CAS No. 65997-13-9; Determination of Ready Biodegradability by the Modified Sturm Test. Report No. 21732. Inveresk Research, Tranet, Scotland.

ENVIRONMENTAL FATE – BIODEGRADATION	
Test Substance	
Chemical Name	Rosin, methyl ester
CAS #	68186-14-1
Method	
Method/Guideline followed	Testing was conducted according to OECD (1992) 301B *Modified Sturm Test*
Test Type (aerobic/anaerobic)	Aerobic
GLP (Y/N)	Y
Year (Study Performed)	2002
Contact time	28 days

Inoculum	Activated sludge from the Haddington Municipal Sewage Treatment Works
Test conditions	Inoculum: Activated sludge microorganisms were obtained from the Haddington Municipal Sewage Treatment Works. The solids content of the sludge was 3.2 g/l. Concentration of test chemical: The test material was used at a concentration of 20 mg DOC/L. Based on the percentage carbon content, a target weight of 51.31 mg of test material was weighed for direct addition to each appropriate bioreactor. Test Setup: Each test item bioreactor contained 1980 ml of mineral media, 20 ml of microbial inoculum and 54 mg of test item. The reference bioreactor contained 1911 ml of mineral media, 20 ml of microbial inoculum and 69 ml of reference material (sodium benzoate) stock. The control bioreactors each contained 1980 ml of mineral media and 20 ml of microbial inoculum. The toxicity control bioreactor contained 1911 ml of mineral media, 20 ml of microbial inoculum, 53.9 mg of test item and 69 ml reference material stock. Each bioreactor was connected to three traps, each trap containing 100 ml of 0.0125 M $Ba(OH)_2$. At trap collection, the trap closes to the bioreactor was taken for titration, the two remaining traps were moved closer to the bioreactor and a fresh trap was placed third in line from the bioreactor. Trap changes were conducted on days 1, 4, 6, 8, 11, 15, 18, 21, 25, and 29. Each sampled trap was titrated with a few drops of phenolphthalein indicator against 0.05M HCl. The pH was determined in each bioreactor on days 0, 28 and 29; if necessary, the pH on day 0 was adjusted to 7.2-7.8. Calculation of Results: The weight of CO_2 evolved was calculated from the titre. The actual titre for each batch of $Ba(OH)_2$ was used as the background titre. The mean titre for the test, reference and control vessels was calculated according to the following equation: Weight CO_2 produced (mg) = 1.1 x (background titre – ml HCl titrated) The net CO_2 production was then calculated by subtracting the control mean CO_2 production from the test and reference material mean CO_2 production values. The percentage biodegradation was calculated by comparing actual CO_2 evolved in test and reference vessels with the theoretical CO_2 evolution. For the test item this was calculated using the DOC addition rate: $\% \text{ degradation} = \frac{\text{Mg } CO_2 \text{ produced}}{\text{mg DOC added} \times 3.67^{*}} \times 100$ * = where 3.67 is the conversion factor (44/12) for carbon to CO_2

Results Degradation % after time	50.7% after 28 days (test article); 86.6% after 28 days (sodium benzoate)
Conclusions	The test article was degraded 50.7 % after 28 days. Under the conditions of the OECD guidelines, it cannot be considered to be readily biodegradable.
Data Quality	Reliable without restrictions– Klimisch Code 1a
Reference	Kelly, C.R. 2002. Rosin, esters with pentaerythritol, CAS No. 8050-26-8; Rosin, esters with glycerol, CAS No. 8050-31-5; Rosin, esters with diethylene glycol, CAS No. 68153-38-8; Rosin, methyl esters, CAS No. 68186-14-1; Rosin, hydrogenated, esters with pentaerythritol, CAS No. 64365-17-9; Rosin, hydrogenated, glycerol ester, CAS No. 65997-13-9; Determination of Ready Biodegradability by the Modified Sturm Test. Report No. 21732. Inveresk Research, Tranet, Scotland.

ENVIRONMENTAL FATE – BIODEGRADATION	
Test Substance	
Chemical Name	Rosin, hydrogenated pentaerythritol ester
CAS #	64365-17-9
Method	
Method/Guideline followed	Testing was conducted according to OECD (1992) 301B *Modified Sturm Test*
Test Type (aerobic/anaerobic)	Aerobic
GLP (Y/N)	Y
Year (Study Performed)	2002
Contact time	28 days
Inoculum	Activated sludge from the Haddington Municipal Sewage Treatment Works
Test conditions	Inoculum: Activated sludge microorganisms were obtained from the Haddington Municipal Sewage Treatment Works. The solids content of the sludge was 3.2 g/l. Concentration of test chemical: The test material was used at a concentration of 20 mg DOC/L. Based on the percentage carbon content, a target weight of 51.31 mg of test material was weighed for direct addition to each appropriate bioreactor. Test Setup: Each test item bioreactor contained 1980 ml of mineral media, 20 ml of microbial inoculum and 54 mg of test item. The reference bioreactor contained 1911 ml of mineral media, 20 ml of microbial inoculum and 69 ml of reference material (sodium benzoate) stock. The control bioreactors each contained 1980 ml of mineral media and 20 ml of microbial inoculum. The toxicity control bioreactor contained 1911 ml of mineral media, 20 ml of microbial inoculum, 53.9 mg of test item and 69 ml reference material stock. Each bioreactor was connected to three traps, each trap containing 100 ml of 0.0125 M $Ba(OH)_2$. At trap collection, the trap closes to the bioreactor was taken for titration, the two remaining traps were moved closer to the bioreactor and a fresh

	trap was placed third in line from the bioreactor. Trap changes were conducted on days 1, 4, 6, 8, 11, 15, 18, 21, 25, and 29. Each sampled trap was titrated with a few drops of phenolphthalein indicator against 0.05M HCl. The pH was determined in each bioreactor on days 0, 28 and 29; if necessary, the pH on day 0 was adjusted to 7.2-7.8. Calculation of Results: The weight of CO_2 evolved was calculated from the titre. The actual titre for each batch of $Ba(OH)_2$ was used as the background titre. The mean titre for the test, reference and control vessels was calculated according to the following equation: Weight CO_2 produced (mg) = 1.1 x (background titre – ml HCl titrated) The net CO_2 production was then calculated by subtracting the control mean CO_2 production from the test and reference material mean CO_2 production values. The percentage biodegradation was calculated by comparing actual CO_2 evolved in test and reference vessels with the theoretical CO_2 evolution. For the test item this was calculated using the DOC addition rate: $\% \text{ degradation} = \frac{\text{Mg } CO_2 \text{ produced}}{\text{mg DOC added} \times 3.67^{*}} \times 100$ * = where 3.67 is the conversion factor (44/12) for carbon to CO_2
Results Degradation % after time	3.0% after 28 days (test article); 89.4% after 28 days (sodium benzoate)
Conclusions	The test article was degraded 3.0 % after 28 days. Under the conditions of the OECD guidelines, it cannot be considered to be readily biodegradable.
Data Quality	Reliable without restrictions– Klimisch Code 1a
Reference	Kelly, C.R. 2002. Rosin, esters with pentaerythritol, CAS No. 8050-26-8; Rosin, esters with glycerol, CAS No. 8050-31-5; Rosin, esters with diethylene glycol, CAS No. 68153-38-8; Rosin, methyl esters, CAS No. 68186-14-1; Rosin, hydrogenated, esters with pentaerythritol, CAS No. 64365-17-9; Rosin, hydrogenated, glycerol ester, CAS No. 65997-13-9; Determination of Ready Biodegradability by the Modified Sturm Test. Report No. 21732. Inveresk Research, Tranet, Scotland.

ENVIRONMENTAL FATE – BIODEGRADATION	
Test Substance	
Chemical Name	Rosin, hydrogenated glycerol ester
CAS #	65997-13-9
Method	

Method/Guideline followed	Testing was conducted according to OECD (1992) 301B *Modified Sturm Test*
Test Type (aerobic/anaerobic)	Aerobic
GLP (Y/N)	Y
Year (Study Performed)	2002
Contact time	28 days
Inoculum	Activated sludge from the Haddington Municipal Sewage Treatment Works
Test conditions	Inoculum: Activated sludge microorganisms were obtained from the Haddington Municipal Sewage Treatment Works. The solids content of the sludge was 3.2 g/l. Concentration of test chemical: The test material was used at a concentration of 20 mg DOC/L. Based on the percentage carbon content, a target weight of 51.31 mg of test material was weighed for direct addition to each appropriate bioreactor. Test Setup: Each test item bioreactor contained 1980 ml of mineral media, 20 ml of microbial inoculum and 54 mg of test item. The reference bioreactor contained 1911 ml of mineral media, 20 ml of microbial inoculum and 69 ml of reference material (sodium benzoate) stock. The control bioreactors each contained 1980 ml of mineral media and 20 ml of microbial inoculum. The toxicity control bioreactor contained 1911 ml of mineral media, 20 ml of microbial inoculum, 53.9 mg of test item and 69 ml reference material stock. Each bioreactor was connected to three traps, each trap containing 100 ml of 0.0125 M $Ba(OH)_2$. At trap collection, the trap closes to the bioreactor was taken for titration, the two remaining traps were moved closer to the bioreactor and a fresh trap was placed third in line from the bioreactor. Trap changes were conducted on days 1, 4, 6, 8, 11, 15, 18, 21, 25, and 29. Each sampled trap was titrated with a few drops of phenolphthalein indicator against 0.05M HCl. The pH was determined in each bioreactor on days 0, 28 and 29; if necessary, the pH on day 0 was adjusted to 7.2-7.8. Calculation of Results: The weight of CO_2 evolved was calculated from the titre. The actual titre for each batch of $Ba(OH)_2$ was used as the background titre. The mean titre for the test, reference and control vessels was calculated according to the following equation: Weight CO_2 produced (mg) = 1.1 x (background titre – ml HCl titrated) The net CO_2 production was then calculated by subtracting the control mean CO_2 production from the test and reference material mean CO_2 production values. The percentage biodegradation was calculated by comparing actual CO_2 evolved in test and reference vessels with the theoretical CO_2 evolution. For the test item this was calculated using the DOC addition rate: Mg CO_2 produced

	% degradation = ---------- x 100 mg DOC added x 3.67* * = where 3.67 is the conversion factor (44/12) for carbon to CO_2
Results Degradation % after time	47.3% after 28 days (test article); 89.4% after 28 days (sodium benzoate)
Conclusions	The test article was degraded 47.3 % after 28 days. Under the conditions of the OECD guidelines, it cannot be considered to be readily biodegradable.
Data Quality	Reliable without restrictions– Klimisch Code 1a
Reference	Kelly, C.R. 2002. Rosin, esters with pentaerythritol, CAS No. 8050-26-8; Rosin, esters with glycerol, CAS No. 8050-31-5; Rosin, esters with diethylene glycol, CAS No. 68153-38-8; Rosin, methyl esters, CAS No. 68186-14-1; Rosin, hydrogenated, esters with pentaerythritol, CAS No. 64365-17-9; Rosin, hydrogenated, glycerol ester, CAS No. 65997-13-9; Determination of Ready Biodegradability by the Modified Sturm Test. Report No. 21732. Inveresk Research, Tranet, Scotland.

ENVIRONMENTAL FATE – BIODEGRADATION	
Test Substance	
Chemical Name	Rosin, partially hydrogenated methyl ester
CAS #	8050-15-5
Method	
Method/Guideline followed	Testing was conducted according to OECD Guideline 301B, *"Ready Biodegradability: Modified Sturm Test."*
Test Type (aerobic/anaerobic)	Aerobic
GLP (Y/N)	Y
Year (Study Performed)	1988
Contact time	28 days
Inoculum	Activated sludge from the Schijndel municipal sewage treatment plant
Test conditions	Inoculum: Activated sludge microorganisms were obtained from the Schijndel municipal sewage treatment plant at Schijndel. Concentration of test chemical: The test material was used at concentrations of 10 and 20 mg/L. Test Setup: Nutrient solution was prepared in bottles by adding a potassium phosphate, magnesium sulfate, calcium chloride, and ferric chloride, and ammonia sulfate solutions as per the OECD test method. To the nutrient solution was added 30 mL of inoculum; the media was aerated with CO_2-free air for 20 hours. After this, three wash bottles per test bottle were filled with 80 mL of barium hydroxide and connected in series to the exit air line of each test bottle. On day 0 of the study, the test material was added to provide final concentrations of 10 and 20 mg/L and positive control (sodium acetate) was added to one test bottle at a concentration of 20 mg/L. One test bottle without test or control

	substances was used as a blank. The media was agitated continuously. CO_2 was captured by reaction in the barium hydroxide bottles. The temperature ranged from 18.5 to 20^{o}C. Sampling frequency: Samples were collected from the first CO_2 absorber vessel on days 2, 5, 7, 9, 12, 14, 16, 21, and 28. Controls: Yes. Analysis: The amount of CO_2 produced was determined by titrating the remaining barium hydroxide in the CO_2 absorber bottles with 0.05 N HCl. Carbon content was determined using a C-absorption apparatus.
Results	
Degradation % after time	17.7 and 28.3% after 28 days (test article at low and high concentrations, respectively); 95.6% after 28 days (sodium benzoate)
Conclusions	The low concentration of the test article was degraded 17.7% after 28 days and the high concentration was degraded 28.3%. Sodium benzoate was degraded 95.6% after 28 days. Under the conditions of the OECD guidelines, the test article cannot be considered to be readily biodegradable.
Data Quality	Reliable without restrictions– Klimisch Code 1a
References	Bogers, M. 1988. Biodegradability study of [trade name deleted; methyl ester of partially hydrogenated rosin] in the modified Sturm test. Study Ref. No. 1065/ST36. RCC NOTOX, The Netherlands.

ECOTOXICITY – ACUTE TOXICITY TO FISH	
Test substance	
Chemical Name	Rosin, pentaerythritol ester
CAS #	8050-26-8
Method	
Method/Guideline followed	OECD Test Method 203, *"Testing of Chemicals, Fish Acute Toxicity Test"* and following procedures in OECD (2000) Series on Testing and Assessment, No. 23, *"Guidance Document on Aquatic Toxicity Testing of Difficult Substances and Mixtures."*
Year	2002
GLP (Y/N)	Y
System of testing	Fathead minnows (*Pimephales promelas)* under static conditions.
Concentration	0, 1, 10, 100 and 1000 mg/l
Results	The 96 hr LL_{50} was > 1000 mg/l the highest loading rate tested. The No Observed Effect Loading Rate ($NOEL_r$) was 1000 mg/l.
Detailed Summary	Rosin, pentaerythritol ester was tested in fathead minnows under static conditions to determine the acute toxicity. Water accommodated fractions (WAF) were prepared using the same conditions as those used to determine the water solubility of this substance. Appropriate weights of the test substance were added to a stirring medium in glass vessels which were sealed to avoid loss of volatile fractions. Using magnetic stirrers, the stirring speed was adjusted to give a stirring vortex 5-10% of the water column. After a stirring period of approximately 48 hr. the

	test solutions were allowed to settle for ca hour. The WAF was then removed via a glass siphon taking care not to remove undissolved material at the top of bottom of the water column. The test organisms were exposed to this WAF. This procedure was adopted to maximize the solubility of the test item under specific test exposure conditions, but to reduce exposure to the test organisms to insoluble fractions. A control medium without the addition of the test item was stirred and extracted in an identical ways as the treated media. The effects of both filtering and adjusting pH were investigated in a range finding test using the highest loading rate (i.e., 1000 mg/l). Because no mortality or other effects were observed in the range finding tests, a definitive-limit test was conducted at the maximum loading rate of 1000 mg/l. The 96 hr LL_{50} was > 1000 mg/l, the highest loading rate tested. The No Observed Effect Loading Rate ($NOEL_r$) was 1000 mg/l.
Data Quality	Valid without restriction – Klimisch Code 1a
Reference	Kelly, C. 2002. Rosin esters with Pentaerythritol, CAS No. 8050-26-8 Determination of Acute Toxicity (LL_{50}) to Fathead Minnows (96 h, Static). Report Number 20784. Inveresk Research, Tranent, Scotland.

ECOTOXICITY – ACUTE TOXICITY TO FISH	
Test substance	
Chemical Name	Rosin, partially hydrogenated methyl ester
CAS #	8050-15-5
Method	
Method/Guideline followed	OECD Test Method 203, *"Testing of Chemicals, Fish Acute Toxicity Test"* and following procedures in OECD (2000) Series on Testing and Assessment, No. 23, *"Guidance Document on Aquatic Toxicity Testing of Difficult Substances and Mixtures."*
Year	2002
GLP (Y/N)	Y
System of testing	Fathead minnows (*Pimephales promelas)* under static conditions.
Concentration	0, 1, 10, 100 and 1000 mg/l
Results	The 96 hr LL_{50} was > 1000 mg/l the highest loading rate tested. The No Observed Effect Loading Rate ($NOEL_r$) was 1000 mg/l.
Detailed Summary	Rosin, partially hydrogenated methyl ester was tested in fathead minnows under static conditions to determine the acute toxicity. Water accommodated fractions (WAF) were prepared using the same conditions as those used to determine the water solubility of this substance. Appropriate weights of the test substance were added to a stirring medium in glass vessels which were sealed to avoid loss of volatile fractions. Using magnetic stirrers, the stirring speed was adjusted to give a stirring vortex 5-10% of the water column. After a stirring period of approximately 48 hr. the test solutions were allowed to settle for ca hour. The WAF was then removed via a glass siphon taking care not to remove undissolved material at the top of bottom of the water column. The test organisms were exposed to this WAF. This procedure was adopted to maximize the solubility of the test item under specific test exposure conditions, but to reduce exposure to the test organisms to insoluble fractions. A control medium without

	the addition of the test item was stirred and extracted in an identical ways as the treated media. The effects of both filtering and adjusting pH were investigated in a range finding test using the highest loading rate (i.e., 1000 mg/l). Because no mortality or other effects were observed in the range finding tests, a definitive-limit test was conducted at the maximum loading rate of 1000 mg/l. The 96 hr LL_{50} was > 1000 mg/l, the highest loading rate tested. The No Observed Effect Loading Rate ($NOEL_r$) was 1000 mg/l.
Data Quality	Valid without restriction – Klimisch Code 1a
Reference	Kelly, C. 2002. Rosin, partially hydrogenated, methyl ester, CAS No. 8050-15-5 Determination of Acute Toxicity (LL_{50}) to Fathead Minnows (96 h, Static). Report Number 20948. Inveresk Research, Tranent, Scotland.

ECOTOXICITY – ACUTE TOXICITY TO DAPHNIA	
Test substance	
Chemical Name	Rosin, pentaerythritol ester
CAS #	8050-26-8
Method	
Method/Guideline followed	OECD Test Method 202, Part 1 *"Testing of Chemicals, Daphnia sp. Acute Immobilization Test"* and following procedures in OECD (2000) Series on Testing and Assessment, No. 23, *"Guidance Document on Aquatic Toxicity Testing of Difficult Substances and Mixtures."*
Year	2002
GLP (Y/N)	Y
System of testing	*Daphnia magna* (water fleas) under static conditions.
Concentration	0, 1, 10, 100 and 1000 mg/l
Results	The 48 hr EL_{50} was > 1000 mg/l; the No Observed Effect Loading Rate ($NOEL_r$) was 1000 mg/l.
Detailed Summary	Rosin, pentaerythritol ester was tested in daphnia under static conditions to determine the acute toxicity. Water accommodated fractions (WAF) were prepared using the same conditions as those used to determine the water solubility of this substance. Appropriate weights of the test substance were added to a stirring medium in glass vessels which were sealed to avoid loss of volatile fractions. Using magnetic stirrers, the stirring speed was adjusted to give a stirring vortex 5-10% of the water column. After a stirring period of approximately 48 hr. the test solutions were allowed to settle for ca hour. The WAF was then removed via a glass siphon taking care not to remove undissolved material at the top of bottom of the water column. The test organisms were exposed to this WAF. This procedure was adopted to maximize the solubility of the test item under specific test exposure conditions, but to reduce exposure to the test organisms to insoluble fractions. A control medium without the addition of the test item was stirred and extracted in an identical ways as the treated media. The effects of both filtering and adjusting pH were investigated in a range finding test. Because there was no mortality in the range finding test at any concentration a definitive limit test was conducted at 1000 mg/l. The 48 hr EL_{50} was > 1000 mg/l and the No Observed Effect

	Loading Rate ($NOEL_r$) was 1000 mg/l.
Data Quality	Valid without restriction – Klimisch Code 1a
Reference	Kelly, C. 2002. Rosin, esters with pentaerythritol, CAS No. 8050-26-8 Determination of Acute Toxicity (EL_{50}) to Daphnia (48 h, Static). Report Number 21051. Inveresk Research, Tranent, Scotland.

ECOTOXICITY – ACUTE TOXICITY TO DAPHNIA	
Test substance	
Chemical Name	Rosin, partially hydrogenated methyl ester
CAS #	8050-15-5
Method	
Method/Guideline followed	OECD Test Method 202, Part 1 *"Testing of Chemicals, Daphnia sp. Acute Immobilization Test"* and following procedures in OECD (2000) Series on Testing and Assessment, No. 23, *"Guidance Document on Aquatic Toxicity Testing of Difficult Substances and Mixtures."*
Year	2002
GLP (Y/N)	Y
System of testing	*Daphnia magna* (water fleas) under static conditions.
Concentration	0, 19, 38, 75, 150, and 300 mg/l
Results	The 48 hr EL_{50} was 27 mg/l; the No Observed Effect Loading Rate ($NOEL_r$) was 19 mg/l.
Detailed Summary	Rosin, partially hydrogenated methyl ester was tested in daphnia under static conditions to determine the acute toxicity. Water accommodated fractions (WAF) were prepared using the same conditions as those used to determine the water solubility of this substance. Appropriate weights of the test substance were added to a stirring medium in glass vessels which were sealed to avoid loss of volatile fractions. Using magnetic stirrers, the stirring speed was adjusted to give a stirring vortex 5-10% of the water column. After a stirring period of approximately 48 hr. the test solutions were allowed to settle for ca hour. The WAF was then removed via a glass siphon taking care not to remove undissolved material at the top of bottom of the water column. The test organisms were exposed to this WAF. This procedure was adopted to maximize the solubility of the test item under specific test exposure conditions, but to reduce exposure to the test organisms to insoluble fractions. A control medium without the addition of the test item was stirred and extracted in an identical ways as the treated media. The effects of both filtering and adjusting pH were investigated in a range finding test at the loading rate of 1000 mg/l. The range finding test was conducted at loading rates of 0, 1, 10, 100 and 1000 mg/l. Filtering the WAF prepared at the 1000 mg/l loading rate reduced toxicity at 24 h although there was 100% mortality at 48 h. In the unfiltered samples, after 48 h, mortality was 80% and 50% at loading rates of 1000 mg/l and 100 mg/l, respectively. No effects were observed at other loading rates. This suggested that insoluble material, possibly a microsuspension, had formed and was influencing toxicity by exerting a physical effect on the *Daphnia.*

	While filtering at a loading rate of 1000 mg/l had shown mitigating effects on toxicity, no samples were filtered in the definitive test conducted at loading rates 19, 38, 75, 150 and 300 mg/l. In this test, analysis indicated that effects at 19 mg/l were not statistically different than the control. The 48 hr EL_{50} was 27 mg/l and the No Observed Effect Loading Rate ($NOEL_r$) was 19 mg/l.
Data Quality	Valid without restriction – Klimisch Code 1a
Reference	Kelly, C. 2002. Rosin, partially hydrogenated, methyl ester, CAS No. 8050-15-5 Determination of Acute Toxicity (EL_{50}) to Daphnia (48 h, Static). Report Number 21156. Inveresk Research, Tranent, Scotland.

ECOTOXICITY – ALGA, GROWTH INHIBITION	
Test substance	
Chemical Name	Rosin, pentaerythritol ester
CAS #	8050-26-8
Method	
Method/Guideline followed	OECD Test Method 201, *"Testing of Chemicals, Alga, Growrh Inhibition Test"* and following procedures in OECD (2000) Series on Testing and Assessment, No. 23, *"Guidance Document on Aquatic Toxicity Testing of Difficult Substances and Mixtures."*
Year	2002
GLP (Y/N)	Y
System of testing	Green alga (*Selenastrum capriconutum)* growth inhibition.
Concentration	0, 1, 10, 100 and 1000 mg/l (definitive test)
Results	The 72 hr EL_{50} for area under growth curve (AUC) and Average Specific Growth Rate (0-72h) was > 1000 mg/l. The No Observed Effect Loading Rate ($NOEL_r$) for Average Specific Growth Rate and AUC was 1000 mg/l.
Detailed Summary	Rosin, pentaerythritol ester was tested in alga to determine the median effective loading (EL_{50}) for growth inhibition. Water accommodated fractions (WAF) were prepared using the same conditions as those used to determine the water solubility of this substance. Appropriate weights of the test substance were added to a stirring medium in glass vessels which were sealed to avoid loss of volatile fractions. Using magnetic stirrers, the stirring speed was adjusted to give a stirring vortex 5-10% of the water column. After a stirring period of approximately 48 hr. the test solutions were allowed to settle for ca hour. The WAF was then removed via a glass siphon taking care not to remove undissolved material at the top of bottom of the water column. The test organisms were exposed to this WAF. This procedure was adopted to maximize the solubility of the test item under specific test exposure conditions, but to reduce exposure to the test organisms to insoluble fractions. A control medium without the addition of the test item was stirred and extracted in an identical ways as the treated media. The effects of both filtering and adjusting pH were investigated in a range finding test at the highest loading rate. Because there was no inhibition of algal growth in the range finding test in any test groups, a definitive test was conducted at 0, 125, 250, 500, and 1000 mg/l with algal cell concentrations recorded after 1, 24, 48 and 76 hrs. This test was conducted using an unfiltered WAF with no pH adjustment.

	As no effects or inhibition was observed the 72 hr EL_{50} was > 1000 mg/l for area under growth curve (AUC) and Average Specific Growth Rate (0-72h). Consequently, the No Observed Effect Loading Rate ($NOEL_r$) for AUC and Average Specific Growth Rate is 1000 mg/l.
Data Quality	Valid without restriction – Klimisch Code 1a
Reference	Kelly, C. 2002. Rosin, esters with Pentaerythritol, CAS No. 8050-26-8 Alga, Growth Inhibition Test (72 h, EL_{50}). Report Number 20834. Inveresk Research, Tranent, Scotland.

ECOTOXICITY – ALGA, GROWTH INHIBITION	
Test substance	
Chemical Name	Rosin, partially hydrogenated methyl ester
CAS #	8050-15-5
Method	
Method/Guideline followed	OECD Test Method 201, *"Testing of Chemicals, Alga, Growrh Inhibition Test"* and following procedures in OECD (2000) Series on Testing and Assessment, No. 23, *"Guidance Document on Aquatic Toxicity Testing of Difficult Substances and Mixtures."*
Year	2002
GLP (Y/N)	Y
System of testing	Green alga (*Selenastrum capriconutum)* growth inhibition.
Concentration	0, 1, 10, 100 and 1000 mg/l (range finding test) 1000 mg/l (definitive test)
Results	The 72 hr EL_{50} for area under growth curve (AUC) and Average Specific Growth Rate (0-72h) was > 1000 mg/l. The No Observed Effect Loading Rate ($NOEL_r$) for Average Specific Growth Rate and AUC was 1000 mg/l.
Detailed Summary	Rosin, partially hydrogenated methyl ester was tested in alga to determine the median effective loading (EL_{50}) for growth inhibition. Water accommodated fractions (WAF) were prepared using the same conditions as those used to determine the water solubility of this substance. Appropriate weights of the test substance were added to a stirring medium in glass vessels which were sealed to avoid loss of volatile fractions. Using magnetic stirrers, the stirring speed was adjusted to give a stirring vortex 5-10% of the water column. After a stirring period of approximately 48 hr. the test solutions were allowed to settle for ca hour. The WAF was then removed via a glass siphon taking care not to remove undissolved material at the top of bottom of the water column. The test organisms were exposed to this WAF. This procedure was adopted to maximize the solubility of the test item under specific test exposure conditions, but to reduce exposure to the test organisms to insoluble fractions. A control medium without the addition of the test item was stirred and extracted in an identical ways as the treated media. The effects of both filtering and adjusting pH were investigated in a range finding test at the highest loading rate. Because there was no inhibition of algal growth in the range finding test at loading rates of 0, 1, 10, 100 or 1000 mg/l, a definitive limit test was conducted at 1000 mg/l with algal cell concentrations recorded after 1, 24, 48 and 76 hrs. This test was conducted using an unfiltered WAF with no pH adjustment.

	As no effects or inhibition was observed the 72 hr EL_{50} was > 1000 mg/l for area under growth curve (AUC) and Average Specific Growth Rate (0-72h). Consequently, the No Observed Effect Loading Rate ($NOEL_r$) for AUC and Average Specific Growth Rate is 1000 mg/l.
Data Quality	Valid without restriction – Klimisch Code 1a
Reference	Kelly, C. 2002. Rosin, partially hydrogenated, methyl ester, CAS No. 8050-15-5 Alga, Growth Inhibition Test (72 h, EL_{50}). Report Number 20840. Inveresk Research, Tranent, Scotland.

ACUTE TOXICITY – ORAL	
Test substance	
Chemical Name	Rosin, pentaerythritol ester
CAS #	8050-26-8
Method	
Method/Guideline followed	OECD Test Method 425*, "Acute Oral Toxicity – Up-and-Down Procedure."*
GLP (Y/N)	Y
Year (Study Performed)	2002
Species	Rat
Strain	Sprague-Dawley
Route of administration	Oral
Dose levels	2000 mg/kg
Sex and number/group	5 female rats
Frequency of treatment	Single oral gavage
Duration of test	14 day observation post-treatment
Control group (Y/N)	N
Result	
Acute Oral LD_{50}	>2000 mg/kg
Detailed Summary	Rosin, pentaerythritol ester (CAS # 8050-26-8) was administered to one female animal at 2000 mg/kg. As this animal survived, 4 additional animals were dosed sequentially at 2000 mg/kg so that a total of 5 animals were tested. The test item was dissolved in corn oil and administered orally in a single dose, by means of a gavage, followed by a 14 day observation period. A constant dose volume of 4 ml/kg was used. The formulations were magnetically stirred and warmed prior to dosing. The dose was calculated based on the weight of the animal on the day of dosing. Clinical observations were conducted frequently after dosing on Day 1 (at approximately ¼, ½, 1 -1½, 2 -2½, 3¼ -3½ and 4½-5¼h) and daily thereafter until Day 15. There were no mortalities during the observation period. No adverse clinical signs were noted during the observation period. Under the conditions of the study, following a single oral administration of rosin, pentaerythritol ester to Sprague-Dawley rats, the median lethal dose (LD_{50}) was estimated to be > 2000 mg/kg.

Data Quality	Valid without restriction – Klimisch Code 1a
Reference	Hutchinson, A.M.K. 2002. Rosin, esters with pentaerythritol (CAS No. 8050-26-8) Acute Oral Toxicity (Up-and-Down Procedure) Test in Rats. Report Number 22003. Inveresk Research, Tranent, Scotland.

ACUTE TOXICITY – ORAL	
Test substance	
Chemical Name	Rosin, partially hydrogenated methyl ester
CAS #	8050-15-5
Method	
Method/Guideline followed	Testing was conducted according to OECD Guideline 401, *"Acute Oral Toxicity."*
GLP (Y/N)	Y
Year (Study Performed)	1988
Species	Rat
Strain	Wistar
Route of administration	Oral
Dose levels	2,000 mg/kg
Sex and number/group	5 male and 5 female rats
Frequency of treatment	Single oral gavage
Duration of test	14 day observation post-treatment
Control group (Y/N)	N
Result	
Acute Oral LD_{50}	>2,000 mg/kg
Detailed Summary	Wistar rats (n = 5/sex) received a single oral (gavage) dose of 2,000 mg/kg of the methyl ester of partially hydrogenated rosin (CAS #8050-15-5) and were observed for 14 days. Parameters evaluated included clinical observations, mortality, body weight, and gross pathology. No deaths occurred and no adverse clinical signs were noted. All animals gained weight during the study. Gross pathology revealed no treatment-related effects. The LD_{50} was greater than 2,000 mg/kg.
Data Quality	Valid without restriction – Klimisch Code 1a
Reference	Daamen, P.A.M. 1988. Acute oral toxicity of [trade name deleted; methyl ester of partially hydrogenated rosin] in the rat. Study No. 1065/1426. RCC NOTOX, The Netherlands.

ACUTE TOXICITY – ORAL	
Test substance	
Chemical Name	Rosin, partially hydrogenated methyl ester
CAS #	8050-15-5
Method	
Method/Guideline followed	Testing was conducted according to OECD Guideline 401, *"Acute Oral Toxicity."*
GLP (Y/N)	Y
Year (Study Performed)	1990
Species	Rat
Strain	Wistar
Route of administration	Oral
Dose levels	2,000 mg/kg

Sex and number/group	5 male and 5 female rats
Frequency of treatment	Single oral gavage
Duration of test	14 day observation post-treatment
Control group (Y/N)	N
Result	
Acute Oral LD_{50}	>2,000 mg/kg
Detailed Summary	Wistar rats (n = 5/sex) received a single oral (gavage) dose of 2,000 mg/kg of the methyl ester of partially hydrogenated rosin (CAS #8050-15-5) and were observed for 14 days. Parameters evaluated included clinical observations, mortality, body weight, and gross pathology. No deaths occurred and no adverse clinical signs were noted. All animals gained weight during the study. Gross pathology revealed no treatment-related effects. The LD_{50} was greater than 2,000 mg/kg.
Data Quality	Valid without restriction – Klimisch Code 1a
Reference	Riebeek, W.M. 1990. Determination of the acute oral toxicity of [trade name deleted; methyl ester of partially hydrogenated rosin] in rats. Report No. V 90.203. TNO-CIVO Institutes, The Netherlands.

ACUTE TOXICITY – ORAL	
Test substance	
Chemical Name	Rosin, methyl ester
CAS #	68186-14-1
Method	
Method/Guideline followed	Testing was similar to OECD Guideline 401, *"Acute Oral Toxicity,"* except no body weight or clinical observation data were collected.
GLP (Y/N)	N (pre-GLP)
Year (Study Performed)	1932
Species	Rat, Guinea Pig, Rabbit
Strain	Not specified
Route of administration	Oral
Dose levels	8,000 to 80,000 mg/kg
Sex and number/group	1 to 3 rats/dose, 1 to 6 guinea pigs/dose, 1 to 3 rabbits/dose; sex not specified for any species
Frequency of treatment	Single oral gavage
Duration of test	10 day observation post-treatment
Control group (Y/N)	N
Result	
Acute Oral LD_{50}	Not identified
Detailed Summary	All species tested received single oral gavage doses of methyl ester of rosin (CAS #68186-14-1). Rats (n = 1 to 3/dose) received doses of 8, 15, 40, 60, or 80 g/kg, guinea pigs (n = 1 to 6/dose) received doses of 8, 15, 20, 40, 60 or 80 g/kg, and rabbits (n = 1 to 3/dose) received doses of 8, 15, 40, 60, or 80 g/kg. All animals were observed for 10 days post-dosing. Parameters evaluated included mortality, urinalysis, gross pathology, and microscopic pathology (liver, kidneys, spleen, lung). Microscopic pathology was only performed on animals surviving the 10-day observation period. Oral dosing produced deaths in rats and guinea pigs as follows: for rats, one mortality

	at 60 g/kg on day 5 and one death at 40 g/kg on day 6; and for guinea pigs, one death at 15 g/kg on day 9, one death at 40 g/kg on day 3, and one death at 80 g/kg on day 12. None of the rabbits died. Urinalyses revealed elevated albumin levels for most of the rabbits and almost all of the guinea pigs. Gross and microscopic pathology revealed no adverse effects in rats. In the guinea pigs, pale liver and kidneys was observed in all dose groups, but a dose-response was not apparent. Microscopic pathology revealed: scant or no glycogen storage, congestion and cloudy swelling in the liver; cloudy swelling of the convoluted tubules of the kidney; and no effects in the spleen and lung. In the rabbits, the kidneys were pale and the liver was congested at necropsy. Microscopic examination revealed moderate glycogen storage and congestion in the liver, cloudy swelling, exudate and congestion in the kidneys, and minor effects in the lung and spleen. Based on these data, the lowest "fatal oral dose" was 40 g/kg in rats, 15 g/kg in guinea pigs, and 80 g/kg in rabbits.
Data Quality	Valid with restrictions – Klimisch Code 2e
Reference	Smyth, H.F., and Smyth, H.F. 1932. Report to Hercules Powder Company on the examination of [trade name deleted; methyl ester of rosin] for acute toxic effect.

ACUTE TOXICITY – ORAL	
Test substance	
Chemical Name	Rosin, methyl ester
CAS #	68186-14-1
Method	
Method/Guideline followed	Testing was similar to OECD Guideline 401, *"Acute Oral Toxicity."*
GLP (Y/N)	N (pre-GLP)
Year (Study Performed)	1945
Species	Rat
Strain	Not specified
Route of administration	Oral
Dose levels	47,500 to 63,000 mg/kg
Sex and number/group	6 to 10/group/lot; sex not specified
Frequency of treatment	Single oral gavage
Duration of test	14 day observation post-treatment
Control group (Y/N)	N
Result	
Acute Oral LD_0	Not identified; LD_0 ranged from 47,500 to 63,000 mg/kg
Detailed Summary	Rats (n = 6 to 10/group/material) received a single oral (gavage) dose of one of four lots of rosin methyl ester (CAS #68186-14-1). Doses administered were 47.5, 50, 45, or 63 g/kg and the animals were observed for 14 days. The only parameter evaluated was mortality. The LD_0 (or dose producing no mortality) ranged from 47,500 to 63,000 mg/kg.
Data Quality	Invalid – Klimisch Code 3b
Reference	Shelanski, H.A. 1945. Letter report on acute toxicity of [trade name deleted; methyl ester of rosin]. Smyth Laboratories, Philadelphia, Pennsylvania.

ACUTE TOXICITY – ORAL	
Test substance	
Chemical Name	Rosin, methyl ester
CAS #	68186-14-1
Method	
Method/Guideline followed	Testing was similar to OECD Guideline 401, *"Acute Oral Toxicity,"* except no body weight or gross pathology data were collected.
GLP (Y/N)	N (pre-GLP)
Year (Study Performed)	1948
Species	Rat, Guinea Pig
Strain	Not specified
Route of administration	Oral
Dose levels	30% solution
Sex and number/group	10 rats/group, 10 guinea pigs; sex not specified for either species
Frequency of treatment	Single oral gavage
Duration of test	14 day observation post-treatment
Control group (Y/N)	Y
Result	
Acute Oral LD_{50}	>14,000 mg/kg in rats, 45,000 mg/kg in guinea pigs
Detailed Summary	Both species received a single oral (gavage) dose of methyl ester of rosin (CAS #68186-14-1). Rats (n = 10/group) received a single oral dose of the material as a 30% solution in propylene glycol or sesame oil. Guinea pigs (n = 10/group) received a single oral dose of the material in sesame oil. Control groups were also included. The animals were observed for 14 days post-dosing. Parameters evaluated included mortality and clinical signs. For the rats, the LD_{50} was 14,000 mg/kg for the test substance in the propylene glycol vehicle and greater than 60,000 mg/kg in the sesame oil vehicle. For the guinea pigs, the LD_{50} was 50,000 mg/kg. Administration of the test substance to rats (n = 10/group) as a 30% solution in propylene glycol or sesame oil produced LD_{50} values of 14,000 and 60,000 mg/kg, respectively. Administration of test substance as a 30% solution to guinea pigs (n = 10/group) resulted in an LD_{50} of 45,000 mg/kg.
Data Quality	Invalid – Klimisch Code 3b
Reference	Shelanski, H.A. 1948. Letter report on the acute oral toxicity of [trade name deleted; methyl ester of rosin]. Smyth Laboratories, Philadelphia, Pennsylvania.

ACUTE TOXICITY – ORAL	
Test substance	
Chemical Name	Rosin, methyl ester
CAS #	68186-14-1
Method	
Method/Guideline followed	Testing was similar to OECD Guideline 401, *"Acute Oral Toxicity,"* except no body weight data were collected.
GLP (Y/N)	N
Year (Study Performed)	1972
Species	Rat

Strain	Wistar
Route of administration	Oral
Dose levels	5,000 mg/kg
Sex and number/group	10 males
Frequency of treatment	Single oral gavage
Duration of test	14 day observation post-treatment
Control group (Y/N)	N
Result	
Acute Oral LD_{50}	>5,000 mg/kg
Detailed Summary	Ten male Wistar rats received a single oral dose of 5,000 mg/kg of Compound 72-71 (CAS #68186-14-1) and were observed for 14 days. Parameters evaluated included clinical signs and gross pathology. The rats were lethargic and one death occurred within the first day of dosing. No information on the results of the gross pathology examination was provided. The LD_{50} was greater than 5,000 mg/kg.
Data Quality	Invalid – Klimisch Code 3a
Reference	Moreno, O.M. 1972. Acute oral toxicity in rats of [trade name deleted; methyl ester of rosin]. Toxicological Resources, East Millstone, New Jersey.

REPEAT DOSE TOXICITY	
Test substance	
Chemical Name	Rosin, hydrogenated glycerol ester
CAS #	65997-13-0
Method	
Method/Guideline followed	Test procedure was similar to OECD Test Method 407*, "Repeat Dose 28-Day Oral Toxicity Study in Rodents,"* except no hematology or clinical chemistry data were collected.
Year	1985
GLP (Y/N)	N
Species	Rat
Strain	Sprague-Dawley
Sex	Male, female
Route of Administration	Oral, diet
Exposure Period	28 days
Frequency of Treatment	Daily
Post-exposure observation period	None
Dose Levels	0.2 and 1% (approximately equivalent to 200 and 1000 mg/kg/day)
Control group (Y/N)	Y
Results	
NOAEL:	0.2%, approximately 200 mg/kg/day
Detailed Summary	Sprague-Dawley rats (n = 10/sex/group) were treated with glyercol ester of hydrogenated rosin (CAS #65997-13-9) in the diet at concentrations of 0, 0.2, or 1% for 28 days. The approximate doses were 0, 200, or 1,000 mg/kg/day, based on standard conversion factors (WHO 1990). Parameters evaluated included mortality, morbidity, body weight, food consumption, gross pathology, and microscopic pathology (brain, heart, thymus, tongue, lungs, liver, kidneys, gonads, epididymides,

	uterus, cervix, prostate, seminal vesicle, spleen, adrenals, thyroid/parathyroid, eye and optic nerve, aorta, pancreas, skin, mammary gland, lymph nodes, trachea, esophagus, stomach, duodenum, jejunum, ileum, cecum, colon, salivary glands, pituitary, spinal cord, sciatic nerve, urinary bladder, muscle, bone and bone marrow, anorectal junction). No deaths or clinical signs were observed in any group. Treated males exhibited similar body weights and body weight gains as control males, but the high-dose females exhibited a significant decrease in body weight throughout the study and a transient decrease in body weight gain during the first two weeks of the study. At 0.2%, a transient decrease in body weight was observed for the females during week 2 only. Food consumption and gross and microscopic pathology were unaffected by treatment. Based on these data, the NOAEL was 0.2% (approximately 200 mg/kg/day).
Data Quality	Valid – Klimisch Code 1b
References	Mann, S.W., Robbins, T.L., and Overmyer, S.K. 1985. Twenty-eight-day dietary screening study for [trade name deleted; glyercol ester of hydrogenated rosin]. Project No. 5-131. Adria Laboratories Inc., Plain City, Ohio. World Health Organization (WHO). 1990. Principles for the Toxicological Assessment of Pesticide Residues in Food.

REPEAT DOSE TOXICITY	
Test substance	
Chemical Name	Rosin, glycerol ester
CAS #	8050-31-5
Method	
Method/Guideline followed	Test procedure was consistent with OECD Test Method 408, *"Repeat Dose 90-Day Oral Toxicity Study in Rodents"*
Year	1989
GLP (Y/N)	Y
Species	Rat
Strain	Charles River
Sex	Male, female
Route of Administration	Oral, diet
Exposure Period	90 days
Frequency of Treatment	Daily
Post-exposure observation period	None
Dose Levels	2000, 5000, and 10000 ppm (approximately equivalent to 136, 339, and 714 mg/kg/day for the males and 156, 402, and 815 mg/kg/day for the females)
Control group (Y/N)	Y
Results	
NOEL:	>10,000 ppm, approximately 800 mg/kg/day
Detailed Summary	Charles River rats (n = 25/sex/group, except for the low dose which was n = 20/sex) were treated with glycerol ester of rosin (CAS #8050-31-5) at dietary concentrations of 0, 2,000, 5,000, or

	10,000 ppm for 90 days. Mean compound consumption was calculated to be approximately: 136 to 139 mg/kg/day for males and 156 to 171 mg/kg/day for females ingesting 2,000 ppm; 339 to 340 mg/kg/day for males and 402 to 403 mg/kg/day for females ingesting 5,000 ppm; and 714 mg/kg/day for males and 815 to 831 mg/kg/day for females ingesting 10,000 ppm. Parameters evaluated included mortality, clinical signs, body weight, food consumption, hematology, clinical chemistry, urinalysis, ophthalmology, fecal examination, gross pathology, organ weights (adrenals, brain, heart, kidneys, liver, ovaries, testes), and microscopic pathology (adrenals, aorta, bone with marrow, brain, eyes with optic nerve, gastrointestinal tract, heart, kidneys, liver, lungs, lymph node, ovaries with oviducts, pancreas, peripheral nerve, prostate, salivary gland, seminal vesicles, skeletal muscle, skin with mammary gland, spinal cord, spleen testes with epididymides, thymus, thyroid/parathyroid, tongue, trachea, urinary bladder, uterus with vagina). An interim sacrifice occurred on day 30 at which rats (n = 5/sex/group) from control, mid- and high-dose groups were necropsied. The test substance did not affect mortality (100% survival), clinical signs, body weight, body weight gain, food consumption, hematology, clinical chemistry, urinalysis, ophthalmology, fecal observations, gross pathology, organ weights, or microscopic pathology. Based on these data, the NOEL was greater than 10,000 ppm (approximately 800 mg/kg/day).
Data Quality	Valid without restriction – Klimisch Code 1a
Reference	Tompkins, E.C. 1989. Ninety-day dietary study in rats with [trade name deleted; glycerol ester of rosin]. Project No. WIL-87003. WIL Research Laboratories Inc., Ashland, Ohio.

REPEAT DOSE TOXICITY	
Test substance	
Chemical Name	Rosin, glycerol ester
CAS #	8050-31-5
Method	
Method/Guideline followed	Test procedure was consistent with OECD Test Method 408, *"Repeat Dose 90-Day Oral Toxicity Study in Rodents"*
Year	1991
GLP (Y/N)	Y
Species	Rat
Strain	Charles River Fischer 344
Sex	Male, female
Route of Administration	Oral, diet
Exposure Period	91 days
Frequency of Treatment	Daily
Post-exposure observation period	None
Dose Levels	625, 1250, and 2500 mg/kg/day
Control group (Y/N)	Y
Results	
NOEL:	>2500 mg/kg/day

Detailed Summary	Fischer 344 rats (n = 20/sex/group) were exposed to glycerol ester of rosin (CAS #8050-31-5) in the diet at concentrations to achieve doses of 0, 625, 1250, or 2500 mg/kg/day for 91 days. Parameters evaluated included mortality, clinical signs, body weight, food consumption, ophthalmology, hematology, clinical chemistry, gross pathology, organ weights (adrenals, brain, cecum, heart, kidneys, liver, ovaries, testes, thymus), and microscopic pathology (adrenals, aorta, bone, bone marrow, brain, eye with optic nerve, gastrointestinal tract, ovaries, testes with epididymis, heart, kidneys, liver, lung, lymph nodes, mammary gland, pancreas, pituitary, prostate with seminal vesicle, salivary gland, sciatic nerve, skeletal muscle, skin, spinal cord, spleen, thymus, thyroid/parathyroid, trachea, urinary bladder, uterus). No deaths occurred and no clinical signs were reported. Slight changes in body weight were reported in the females at 1,250 and 2,500 mg/kg/day (during the latter weeks) and in the males at 2,500 mg/kg/day (during week 8). Food consumption was significantly increased in the high-dose males and females. Some increases were reported in the 1,250 mg/kg/day males. No treatment-related effects were reported on ophthalmology, hematology, clinical chemistry, gross pathology, or microscopic pathology. Some organ weight increases were reported, but due to a lack of concomitant pathological changes they were not considered to be treatment-related. The authors concluded that the NOAEL was 2,500 mg/kg/day.
Data Quality	Valid without restriction – Klimisch Code 1a
Reference	Blair, M. 1991. Thirteen-week dietary toxicity study in rats. Study No. 548-007. International Research and Development Corporation, Mattawan, Michigan.

REPEAT DOSE TOXICITY	
Test substance	
Chemical Name	Rosin, hydrogenated glycerol ester
CAS #	65997-13-9
Method	
Method/Guideline followed	Test procedure was consistent with OECD Test Method 408, "*Repeat Dose 90-Day Oral Toxicity Study in Rodents"*
Year	1987
GLP (Y/N)	Y
Species	Rat
Strain	Sprague-Dawley COBS
Sex	Male, female
Route of Administration	Oral, diet
Exposure Period	90 days
Frequency of Treatment	Daily
Post-exposure observation period	None
Dose Levels	2000, 5000, and 10000 ppm (approximately equivalent to 200, 500, and 1,000 mg/kg/day)
Control group (Y/N)	Y

Results	
NOEL:	>10000 ppm, approximately 1000 mg/kg/day
Detailed Summary	Sprague Dawley rats (n = 25/sex/group, except for the low dose which was n = 20/sex) were treated with glycerol ester of hydrogenated rosin (CAS #65997-13-9) in the diet at concentrations of 0, 2000, 5000, or 10000 ppm for 90 days. The approximate doses were 0, 200, 500 or 1,000 mg/kg/day, based on standard conversion factors (WHO 1990). Parameters evaluated included mortality, clinical signs, body weight, food consumption, hematology, clinical chemistry, urinalysis, ophthalmology, fecal parameters, gross pathology, organ weights, and microscopic pathology (adrenals, aorta, bone with marrow, brain, eyes with optic nerve, esophagus, stomach, duodenum, jejunum, ileum, cecum, colon, rectum, heart, kidneys, liver, lungs, lymph node, ovary, pancreas, peripheral nerve, pituitary, prostate, salivary gland, seminal vesicles, skeletal muscle, skin with mammary gland, spinal cord, spleen, testes with epidydimides, thymus, thyroids, tongue, trachea, urinary bladder, uterus with vagina). At 30 days, an interim sacrifice occurred (n = 5/sex/group) for the control, mid- and high-dose groups. One control male died during week 11 due to a cerebral hemorrhage. All other animals survived and no clinical signs were observed. No treatment-related effects were reported on body weight, body weight gain, food consumption, hematology, clinical chemistry, urinalysis, ophthalmology, fecal parameters, gross pathology, organ weights, or microscopic pathology. Based on these data, the NOEL was 10,000 ppm (approximately 1,000 mg/kg/day).
Data Quality	Valid without restriction – Klimisch Code 1a
References	Laveglia, J. 1987. Ninety-day dietary study in rats with [trade name deleted; glycerol ester of hydrogenated rosin]. Project No. WIL-87001. WIL Research Laboratories, Inc., Ashland, Ohio. World Health Organization (WHO). 1990. Principles for the Toxicological Assessment of Pesticide Residues in Food.

REPEAT DOSE TOXICITY	
Test substance	
Chemical Name	Rosin, pentaerythritol ester
CAS #	8050-26-8
Method	
Method/Guideline followed	Test procedure was similar to OECD Test Method 408, *"Repeat Dose 90-Day Oral Toxicity Study in Rodents,"* except limited hematology data and no clinical chemistry data were collected.
Year	1960
GLP (Y/N)	N (pre-GLP)
Species	Rat
Strain	Sprague-Dawley
Sex	Male, female
Route of Administration	Oral, diet
Exposure Period	90 days

Frequency of Treatment	Daily
Post-exposure observation period	None
Dose Levels	0.01, 0.05, 0.2, 1, and 5% (approximately equivalent to 10, 50, 200, 1000 and 5,000 mg/kg/day)
Control group (Y/N)	Y
Results	
NOEL:	1%, approximately 1000 mg/kg/day
Detailed Summary	Sprague-Dawley rats (n = 10/sex/group) were treated with pentaerythritol ester of rosin (CAS #8050-26-8) at dietary concentrations of 0, 0.01, 0.05, 0.2, 1, or 5% for 90 days. The approximate doses were 0, 10, 50, 200, 1,000, or 5,000 mg/kg/day, based on standard conversion factors (WHO 1990). Parameters evaluated included mortality, clinical signs, body weight, body weight gain, food utilization, food consumption, hematology, urinalysis, gross pathology, organ weights (brain, heart, liver, kidneys, spleen, testes, ovaries), and microscopic pathology (brain, liver, spleen, stomach, small intestine, colon, pancreas, kidneys, urinary bladder, adrenals, gonads, thyroid, parathyroid, lymph nodes, heart, lungs, bone marrow, muscle, prostate, uterus). One animal from the 0.05, 0.2, and 1% groups died on days 42, 48, and 42, respectively. Two animals from the 5% group died on days 53 and 58. No treatment trend was observed. Treatment did not affect body weight, body weight gain, clinical signs, hematology, urinalysis, or gross pathology. Food consumption was decreased at 5%, but food utilization (grams of weight gained/grams of food consumed) was unaffected. This suggests that the decrease in consumption was related to palatability. Absolute and relative liver weights were significantly increased in the high-dose males and females, however, no changes were observed at histopathology. Based on these data, the NOEL is 1% (approximately 1,000 mg/kg/day).
Data Quality	Valid without restriction – Klimisch Code 1b
References	Calandra, J.C. 1960. Ninety-day subacute oral toxicity of [trade name deleted; pentaerythritol ester of rosin]. Industrial Bio-Test Laboratories, Inc., Northbrook, Illinois. World Health Organization (WHO). 1990. Principles for the Toxicological Assessment of Pesticide Residues in Food.

REPEAT DOSE TOXICITY	
Test substance	
Chemical Name	Rosin, pentaerythritol ester
CAS #	8050-26-8
Method	
Method/Guideline followed	Test procedure was similar to OECD Test Method 408, *"Repeat Dose 90-Day Oral Toxicity Study in Rodents,"* except limited hematology data and no clinical chemistry data were collected.
Year	1960
GLP (Y/N)	N (pre-GLP)
Species	Rat

Strain	Sprague-Dawley
Sex	Male, female
Route of Administration	Oral, diet
Exposure Period	90 days
Frequency of Treatment	Daily
Post-exposure observation period	None
Dose Levels	0.01, 0.05, 0.2, 1, and 5% (approximately equivalent to 10, 50, 200, 1000 and 5,000 mg/kg/day)
Control group (Y/N)	Y
Results	
NOEL:	1%, approximately 1000 mg/kg/day
Detailed Summary	Sprague-Dawley rats (n = 10/sex/group) were treated with pentaerythritol ester of rosin (CAS #8050-26-8) at dietary concentrations of 0, 0.01, 0.05, 0.2, 1, or 5% for 90 days. The approximate doses were 0, 10, 50, 200, 1,000, or 5,000 mg/kg/day, based on standard conversion factors (WHO 1990). Parameters evaluated included mortality, clinical signs, body weight, body weight gain, food utilization, food consumption, hematology, urinalysis, gross pathology, organ weights (brain, heart, liver, kidneys, spleen, testes, ovaries), and microscopic pathology (brain, liver, spleen, stomach, small intestine, colon, pancreas, kidneys, urinary bladder, adrenals, gonads, thyroid, parathyroid, lymph nodes, heart, lungs, bone marrow, muscle, prostate, uterus). No animals died and no clinical signs were observed. Treatment did not affect body weight, body weight gain, hematology, or urinalysis. Food consumption was decreased at 5% and food utilization was increased at this concentration. The higher corn oil content at this dose level may explain these findings. At necropsy, the testes in the 5% males were diminished in size. In addition, the absolute and relative testes weights were statistically significantly decreased. Histopathology revealed decreased numbers of developing spermatozoa, maturation arrest of spermatozoa, and strange morphological forms in the high-dose males. Based on these data, the NOEL is 1% (approximately 1,000 mg/kg/day).
Data Quality	Valid without restriction – Klimisch Code 1b
References	Calandra, J.C. 1960. Ninety-day subacute oral toxicity of [trade name deleted; pentaerythritol ester of rosin]. Industrial Bio-Test Laboratories, Inc., Northbrook, Illinois. World Health Organization (WHO). 1990. Principles for the Toxicological Assessment of Pesticide Residues in Food.

REPEAT DOSE TOXICITY	
Test substance	
Chemical Name	Rosin, glycerol ester
CAS #	8050-31-5
Method	
Method/Guideline followed	Test procedure was similar to OECD Test Method 408, *"Repeat Dose 90-Day Oral Toxicity Study in Rodents."*

Year	1982
GLP (Y/N)	N
Species	Rat
Strain	Sprague-Dawley
Sex	Male, female
Route of Administration	Oral, diet
Exposure Period	90 days
Frequency of Treatment	Daily
Post-exposure observation period	None
Dose Levels	0.2, 1, and 5% (approximately equivalent to 200, 1000 and 5,000 mg/kg/day)
Control group (Y/N)	Y
Results	
NOAEL:	1%, approximately 1000 mg/kg/day
Detailed Summary	Sprague-Dawley rats (n = 15/sex/group) were treated with glycerol ester of rosin (CAS #8050-31-5) at dietary concentrations of 0, 0.2, 1, or 5% for 90 days. The approximate doses were 0, 200, 1,000, or 5,000 mg/kg/day, based on standard conversion factors (WHO 1990). Parameters evaluated included mortality, clinical signs, body weight, food consumption, hematology, clinical chemistry, urinalysis, fecal examination, gross pathology, organ weights (adrenals, brain, ovaries, thyroid/parathyroid, heart, kidneys, liver, spleen, testes), and microscopic pathology (adrenals, anorectal junction, aorta, bone and bone marrow, cecum, cervix, colon, duodenum, epididymides, lymph node, ovaries, pancreas, parathyroid/thyroid, pituitary, prostate, salivary glands, sciatic nerve, seminal vesicles, skeletal muscle, esophagus, eye and optic nerve, heart, ileum, jejunum, kidneys, liver, lung, mammary gland, skin, spinal cord, spleen, stomach, testes, thymus, tongue, trachea, urinary bladder, uterus). One high-dose male died on day 89 exhibiting a swollen, bleeding nose and difficulty breathing one day prior to death and epistaxis three hours prior to death. No clinical signs were observed in any dose group and no other deaths were reported. Treatment did not affect body weight, hematology, clinical chemistry, urinalysis, or fecal examination. Food consumption was statistically significantly decreased in the high-dose males during weeks one through five and 13 and in the high-dose females during weeks one through three, five and nine. These decreases were determined to be related to the palatability of the test material. Dose-related, statistically significant increases were reported in absolute and relative liver weights in the high-dose females, and in relative liver weight in the high-dose males and in the mid-dose males and females. Histopathology revealed very slight to slight periportal hepatocytic vacuolation in the high-dose females only. No other histopathological changes were noted. Based on these data, the NOAEL was 1% (approximately 1,000 mg/kg/day).
Data Quality	Valid without restriction – Klimisch Code 1b
References	Mann, S.W., Iuliucci, J.D., and Schlicht, M.P. 1982. Three month toxicity study on [trade name deleted; glycerol ester of rosin] given orally (diet) to rats. Project No. 5-073. Adria Laboratories Inc., Plain City, Ohio.

	World Health Organization (WHO). 1990. Principles for the Toxicological Assessment of Pesticide Residues in Food.

REPEAT DOSE TOXICITY	
Test substance	
Chemical Name	Rosin, glycerol ester
CAS #	8050-31-5
Method	
Method/Guideline followed	Test procedure was similar to OECD Test Method 408*, "Repeat Dose 90-Day Oral Toxicity Study in Rodents,"* except limited hematology data and no clinical chemistry data were collected.
Year	1960
GLP (Y/N)	N (pre-GLP)
Species	Rat
Strain	Sprague-Dawley
Sex	Male, female
Route of Administration	Oral, diet
Exposure Period	90 days
Frequency of Treatment	Daily
Post-exposure observation period	None
Dose Levels	0.01, 0.05, 0.2, 1, and 5% (approximately equivalent to 10, 50, 200, 1000 and 5,000 mg/kg/day)
Control group (Y/N)	Y
Results	
NOEL:	1%, approximately 1000 mg/kg/day
Detailed Summary	Sprague-Dawley rats (n = 10/sex/group) were treated with glycerol ester of rosin (CAS #8050-31-5) at dietary concentrations of 0, 0.01, 0.05, 0.2, 1, or 5% for 90 days. The approximate doses were 0, 10, 50, 200, 1,000, or 5,000 mg/kg/day, based on standard conversion factors (WHO 1990). Parameters evaluated included mortality, clinical signs, body weight, body weight gain, food consumption, food utilization, hematology, urinalysis, gross pathology, organ weights (brain, heart, liver, kidneys, spleen, testes, ovaries), and microscopic pathology (brain, liver, spleen, stomach, small intestine, colon, pancreas, kidneys, urinary bladder, adrenals, gonads, thyroid, parathyroid, lymph nodes, heart, lungs, bone marrow, muscle, prostate, uterus). No deaths occurred and no adverse clinical signs were noted. Body weight and body weight gain were not affected by treatment. In the high-dose group, food consumption was slightly decreased, but food utilization (grams of body weight gained/grams of food consumed) was increased. The higher utilization values were related to the higher caloric content of the 5% dose group. No treatment related effects on hematology, urinalysis, gross pathology or organ weights were reported. Histopathology did not reveal any adverse effects. Based on these data, the NOEL was 1% (approximately 1,000 mg/kg/day).
Data Quality	Valid without restriction – Klimisch Code 1b
References	Calandra, J.C. 1960. Ninety-day subacute oral toxicity of [trade

	name deleted; glycerol ester of rosin]. Industrial Bio-Test Laboratories, Inc., Northbrook, Illinois. World Health Organization (WHO). 1990. Principles for the Toxicological Assessment of Pesticide Residues in Food.

REPEAT DOSE TOXICITY	
Test substance	
Chemical Name	Rosin, hydrogenated glycerol ester
CAS #	65997-13-9
Method	
Method/Guideline followed	Test procedure was similar to OECD Test Method 408, *"Repeat Dose 90-Day Oral Toxicity Study in Rodents,"* except limited hematology data and no clinical chemistry data were collected.
Year	1967
GLP (Y/N)	N (pre-GLP)
Species	Rat
Strain	Charles River
Sex	Male, female
Route of Administration	Oral, diet
Exposure Period	90 days
Frequency of Treatment	Daily
Post-exposure observation period	None
Dose Levels	0.2, 1, and 5% (approximately equivalent to 200, 1000 and 5,000 mg/kg/day)
Control group (Y/N)	Y
Results	
NOEL:	1%, approximately 1000 mg/kg/day
Detailed Summary	Charles River rats (n = 10/sex/group) were exposed to glycerol ester of hydrogenated rosin (CAS #65997-13-9) in the diet at concentrations of 0, 0.2, 1, or 5% for 90 days. The approximate doses were 0, 200, 1,000 or 5000 mg/kg/day, based on standard conversion factors (WHO 1990). Parameters evaluated included mortality, clinical signs, body weight, body weight gain, food consumption, hematology, urinalysis, gross pathology, organ weights (liver, kidneys, spleen, gonads, heart, thyroids, adrenals, brain), and microscopic pathology (esophagus, stomach, small intestine, cecum, colon, liver, kidney, spleen, pancreas, urinary bladder, pituitary gland, adrenal gland, testis, ovary, thyroid gland, parathyroid gland, heart, lung, lymph node, bone marrow, skeletal muscle, uterus, seminal vesicle, trachea, prostate, salivary gland, eye, optic nerve, peripheral nerve, spinal cord, brain). One control male died on day 78, but no other deaths occurred and no clinical signs were noted. No treatment-related effects were reported on body weight, body weight gain, hematology, urinalysis, gross pathology, organ weights, or microscopic pathology. High-dose male and female rats exhibited a decrease in food consumption throughout the study. It was suggested that this was due to the high corn oil content in the 5% diet. Based on

	these data, the NOEL was 1% (approximately 1,000 mg/kg/day).
Data Quality	Valid without restriction – Klimisch Code 1b
References	Calandra, J.C. 1967. Ninety-day subacute oral toxicity of [trade name deleted; glycerol ester of hydrogenated rosin] – albino rats. IBT No. B 4862. Industrial Bio-Test Laboratories, Inc., Northbrook, Illinois. World Health Organization (WHO). 1990. Principles for the Toxicological Assessment of Pesticide Residues in Food.

REPEAT DOSE TOXICITY	
Test substance	
Chemical Name	Rosin, pentaerythritol ester
CAS #	8050-26-8
Method	
Method/Guideline followed	Test procedure was similar to OECD Test Method 452, *"Chronic Toxicity Studies,"* except only one dose was administered, and limited hematology data and no clinical chemistry or ophthalmology data were collected.
Year	1962
GLP (Y/N)	N (pre-GLP)
Species	Rat
Strain	Sprague-Dawley
Sex	Male, female
Route of Administration	Oral, diet
Exposure Period	Two years
Frequency of Treatment	Daily
Post-exposure observation period	None
Dose Levels	0.05% (approximately equivalent to 50 mg/kg/day)
Control group (Y/N)	Y
Results	
NOAEL:	0.05%, approximately 50 mg/kg/day
Detailed Summary	Sprague-Dawley rats (n = 30/sex/group) were exposed to pentaerythritol ester of rosin (CAS #8050-26-8) in the diet at concentrations of 0, 0 or 0.05% for two years (i.e., two control groups). The approximate doses were 0 or 50 mg/kg/day, based on standard conversion factors (WHO 1990). Parameters evaluated included mortality, clinical signs, body weight, body weight gain, food utilization, food consumption, hematology, urinalysis, gross pathology, tumor incidence, organ weights (liver, kidneys, spleen, gonads, heart, brain, thyroid, adrenals), and microscopic pathology (heart, lung, trachea, liver, pancreas, stomach, small intestine, colon, spleen, lymph node, kidney, urinary bladder, testis, ovary, prostate, uterus, pituitary, adrenal gland, salivary gland, thyroid gland, parathyroid gland, skeletal muscle, bone marrow, brain). At 12 months, an interim sacrifice occurred (n = 5/sex/group). The number of animals dying or sacrificed moribund (from tumors) was: 12 males and 6 females in the first control group; 7 males and 9 females in the second control group; and 9 males

	and 10 females in the 0.05% group. No treatment effect was evident and the deaths were largely related to respiratory illness. Treatment did not affect body weight, body weight gain, food consumption, food utilization, hematology, urinalysis, gross pathology, organ weights or microscopic pathology. The number of tumor bearing animals was: 0 males and 5 females in the first control group; 0 males and 9 females in the second control group; and 2 males and 7 females in the 0.05% group. In all groups, the tumors were primarily subcutaneous fibroadenomas or adenofibromas. No treatment-related effect was apparent.
Data Quality	Valid with restriction – Klimisch Code 2e
References	Kay, J.H. 1962. Two-year chronic oral toxicity of [trade name deleted; pentaerythritol ester of rosin] – albino rats. Industrial Bio-Test Laboratories, Inc., Northbrook, Illinois. World Health Organization (WHO). 1990. Principles for the Toxicological Assessment of Pesticide Residues in Food.

REPRODUCTIVE/DEVELOPMENTAL TOXICITY SCREENING TEST	
Test substance	
Chemical Name	Rosin, pentaerythritol ester
CAS #	8050-26-8
Method	
Method/Guideline followed	OECD Test Guideline 421, *"Reproduction/Developmental Toxicity Screening Test."*
GLP (Y/N)	Y
Year (Study Performed)	2003
Species	Rat
Strain	Sprague-Dawley
Route of administration	Oral via diet
Dose levels	0, 1000, 5000 and 20,000 ppm
Sex and number/group	40 males and 40 females
Frequency of treatment	Males were treated for at least 4 weeks overall, starting from 2 weeks prior to mating until termination; females were treated for 2 weeks prior to mating, then through mating until termination after Day 4 of lactation.
Duration of test	4 weeks
Control group (Y/N)	Y
Result	
Parental NOEL Reproductive/developmental NOEL	20,000 ppm (approximately 2000 mg/kg/day) 20,000 ppm (approximately 2000 mg/kg/day)
Detailed Summary	Four groups of 10 male and 10 female Sprague-Dawley rats received the rosin, pentaerythritol ester *via* the diet at concentrations of 0, 1000, 5000 and 20,000 ppm (approximate doses of 100, 500 and 2000 mg/kg/day). The males were dosed for at least 4 weeks, starting from 2 weeks prior to mating. The females were dosed from 2 weeks prior to mating until at least Day 6 of lactation. The animals were monitored for clinical signs, body weight, food consumption, mating and litter performance. All animals were submitted for necropsy, which included weighing male reproductive organs. Histopathology was conducted on the epididymides and testes of all control and high dose males and

	on the ovaries of all control and high dose females. There were no obvious effects of treatment at any dose level on body weight or food consumption. While the male fertility index at 5000 and 20,000 ppm was slightly lower, this finding was within the historical background range for male fertility and could not be positively attributed to treatment with rosin pentaerythritol ester. There was no effect of treatment on male mating performance and fertility indices at 1000 ppm or on female fertility and duration of gestation in any treatment group. There were no obvious effects of treatment at any dose level on mean number of live pups born when compared with control, or on the number of implants. In all treated groups, group mean litter and pup weights were slightly lower than control over Days 1-4 of lactation, although weight gain between Days 1-4 was comparable with controls. However, there was no clear relationship between group mean litter and pup weights and dose. There were no treatment related abnormalities noted among pups. There was no obvious effect of treatment on epididymis or testes weights in any treatment group and no histology or necropsy findings that could be attributed to treatment at any dose level. Under the conditions of this study, there were no obvious effects of treatment with rosin, pentaerythritol ester noted at any of the dose levels, i.e., 1000, 5000 and 20000 ppm. Consequently, the No Observed Effect Level (NOEL) for rosin, pentaerythritol ester was 20,000 ppm (approximately 2000 mg/kg/day)
Data Quality	Valid without restriction – Klimisch Code 1a
Reference	Clubb, S. 2003. Rosin, Pentaerythritol Ester (CAS No. 8050-26-8) Reproduction/Developmental Toxicity Screening Test. Report Number 23132. Inveresk Research, Tranent, Scotland.

REPEAT DOSE TOXICITY WITH REPRODUCTIVE/DEVELOPMENTAL TOXICITY SCREENING TEST	
Test substance	
Chemical Name	Rosin, partially hydrogenated methyl ester
CAS #	8050-15-5
Method	
Method/Guideline followed	OECD Test Guideline 422, *"Combined Repeated Dose Toxicity Study with the Reproduction/Developmental Toxicity Screening Test."*
GLP (Y/N)	Y
Year (Study Performed)	2003
Species	Rat
Strain	Sprague-Dawley
Route of administration	Oral via diet
Dose levels	0, 5000, 10,000 and 20,000 ppm
Sex and number/group	40 males and 40 females
Frequency of treatment	Males were treated for at least 4 weeks overall, starting from 2

	weeks prior to mating until termination; females were treated for 2 weeks prior to mating, then through mating until termination after Day 4 of lactation.
Duration of test	4 weeks
Control group (Y/N)	Y
Result	
Parental NOEL Reproductive/developmental NOEL	None None
Detailed Summary	Four groups of 10 male and 10 female Sprague-Dawley rats received the rosin, partially hydrogenated methyl ester *via* the diet at concentrations of 0, 5000, 10,000 and 20,000 ppm (approximate doses of 400, 760 and 1530 mg/kg/day). The males were dosed for at least 4 weeks, starting from 2 weeks prior to mating. The females were dosed from 2 weeks prior to mating until at least Day 6 of lactation. The animals were monitored for clinical signs, body weight, food consumption, mating and litter performance. Blood samples were taken from 5 males and 5 females per group for laboratory investigations. Males were sampled during Week 4: females were sampled on Day 6 of lactation. All animals were subjected to necropsy, which included weighing of major organs. Histopathology was conducted on tissues from 5 males and 5 females from the control and high dose groups. In addition, livers from 5 male and 5 female animals from the low and intermediate dose groups were also processed and examined histologically. Effects of treatment included reduced body weight gain and food consumption at all levels. In male animals, there was a reduction in mean body weight gain in the first week of treatment at all dietary levels with the greatest reduction at 20,000 ppm. After one week of treatment, mean body weight gains were similar to those of controls. In females at all treatment levels, group mean body weight gain prior to mating was lower than that of the controls, with further reductions during gestation and lactation. The extent of the reduction during gestation/ lactation was dependent on the concentration of the diet, with a similar trend noted prior to mating. In males, there was a dose related reduction in food consumption in all treated groups in the first week of treatment; thereafter mean food consumption was comparable with control. In females at 10,000 and 20,000 ppm there was a reduction in food consumption on commencement of treatment which persisted for the remainder of the study. There was a notable reduction in food consumption in animals treated at 20,000 ppm during Days 0-4 of lactation while at 5000 ppm there was a slight reduction in food consumption during the pre-mating period and the first two weeks of gestation, and during lactation. Mating performance or fertility was not affected by treatment. There were no obvious effects on the duration of gestation at any dose level. At 20,000 ppm, there was a slight decrease in the mean number of implant sites per pregnancy, although litter size at birth was similar to controls. There were no effects on the number of live young born at any dose level, or on the number of

	implants at the lower doses. At 20,000 ppm mean pup weights in the 5 poorest performing animals were lower on Day 4 of lactation than they had been on Day 1 of lactation. In the remaining 5 litters at 20,000 ppm, pup survival was 100% and the mean pup and litter weights increased between Day 1 and 4 of lactation although weight gain was lower than in control litters. At 5000 and 10,000 ppm, mean pup weights and mean litter weights were also lower than controls. However, following adjustment for lower maternal body weights by analysis of covariance, the adjusted litter weights on Day 1 of lactation were similar in all groups. There were no obvious effects of treatment on litter survival at 5000 and 10,000 ppm. There was a dose related increase in liver weight in both sexes at all levels. At 20,000 ppm in males there was a slight decrease in the absolute lung weight, but this marginal difference was no longer apparent after covariance adjustment, and was not considered to be of biological significance. In females, mean heart, kidney, lung, spleen and salivary gland were all lower than the Controls and often achieved statistical significance following analysis of variance. These findings were considered to reflect the low body weights of the females and following adjustment for the lower body weight (by analysis of covariance) these differences were no longer apparent. Histological examination of the liver revealed hepatocellular hypertrophy in all animals treated at 10,000 and 20,000 ppm. At 5000 ppm hepatocellular hypertrophy was recorded in 1 male and 1 female (out of 5 per sex). Thymic atrophy was observed in 4/8 20,000 ppm females examined. Effects of treatment with rosin, partially hydrogenated methyl ester included reduced body weight gain and food consumption at all dose levels. Previous studies with Tall Oil and Rosin demonstrated that initially animals prefer not to eat diets containing these substances. This was considered to be indicative of a palatability issue. However, the parental palatability issues in the present study associated with all dietary levels appeared to be far more severe and persistent. A dose related increase in liver weights in both sexes was associated with an increase in the incidence of hepatocellular hypertrophy across all groups. These findings were considered most likely to reflect an adaptive change in liver metabolism. There was no evidence of cell damage, cholestasis or changes to lipid metabolism revealed by histological examination, that would support the slight increases in alanine transferase, bilirubin and cholesterol levels, although these changes may be related to the increased workload of the liver. The poor reproductive performance, of the adult females treated at 20,000 ppm, was attributed to a number of factors including reduced body weight and food consumption performance, and

	increased metabolic workload during gestation, parturition and lactation. Of interest is the fact that the five females whose litters increased in weight over Days 1 to 4 of lactation had increased liver weights compared to those who didn't. Analysis of covariance suggested that the lower litter weights on Day 1 of lactation were associated with lower maternal weights. In conclusion, due to severe palatability issues surrounding the dietary consumption of rosin, partially hydrogenated methyl ester which resulted in reduced food consumption, body weight gain and hepatocellular hypertrophy secondary to an adaptive change in liver metabolism, it was not possible to establish a parental No Observed Effect Level (NOEL) nor was there a NOEL for pups. However, it should be noted that all effects observed can be readily explained by the above described consequences of reduced food consumption and resulting body weight effects.
Data Quality	Valid without restriction – Klimisch Code 1a
Reference	Clubb, S. 2003. Rosin, PHME (CAS No. 8050-15-5) Combined Repeated Dose Toxicity Study with Reproduction/Developmental Toxicity Screening Test. Report Number 22143. Inveresk Research, Tranent, Scotland.

IN VITRO GENETIC TOXICITY	
Test substance	
Chemical Name	Rosin, glycerol ester
CAS #	8050-31-5
Method	
Method/Guideline followed	Test was consistent with OECD Test Method 471, *"Bacterial Reverse Mutation Test"*
Year	1988
GLP (Y/N)	Y
System of testing	*S. typhimurium* strains TA98, TA100, TA1535, TA1537, TA1538
Concentration	2.5 to 500 μg/plate
Metabolic activation	With and without
Results	Non-mutagenic
Detailed Summary	Glycerol ester of rosin (CAS #8050-31-5) was incubated with five strains of *Salmonella typhimurium* (TA100, TA98, TA1538, TA1537, TA1535) in the presence and absence of a metabolic activating system (S9 mix). In the definitive assay, concentrations ranging from 2.5 to 500 μg/plate were tested. The study was conducted in duplicate. Both positive and negative controls were employed. No increase in the number of revertant colonies was measured in either the presence or absence of S9 mix. Glycerol ester of rosin was not mutagenic in this assay.
Data Quality	Valid without restriction – Klimisch Code 1a
Reference	Jagannath, D.R. 1988. Mutagenicity test on [trade name deleted; glycerol ester of rosin] in the Ames Salmonella/microsome reverse mutation assay. HLA Study No. 10349-0-401. Hazleton Laboratories America, Inc., Kensington, Maryland.

IN VITRO GENETIC TOXICITY	
Test substance	
Chemical Name	Rosin, glycerol ester
CAS #	8050-31-5
Method	
Method/Guideline followed	Test was consistent with OECD Test Method 473, *"In Vitro Mammalian Cytogenetic Test"*
Year	1988
GLP (Y/N)	Y
System of testing	Chinese hamster ovary cells
Concentration	50.7 to 507 μg/mL
Metabolic activation	With and without
Results	Non-mutagenic
Detailed Summary	Glycerol ester of rosin (CAS #8050-31-5) was incubated with Chinese hamster ovary (CHO) cells in the presence and absence of a metabolic activating system (S9 mix). In the nonactivation assay, cells were treated with the test article for 7.3 hours, washed and treated with Colcemid for 2.5 hours. In the activation assay, cells were treated with the test article for 2 hours, washed, and treated with Colcemid for the final 2.5 hours of the ten-hour incubation period. After this treatment time, the cells were prepared for cyogenetic analysis; 100 cells per culture were examined. In the definitive assay, concentrations ranging from 50.7 to 507 μg/mL were tested. The study was conducted in duplicate. Positive controls were employed. No increase in the number of chromosomally aberrant cells was measured in either the presence or absence of S9 mix. Glycerol ester of rosin was not mutagenic in this assay.
Data Quality	Valid without restriction – Klimisch Code 1a
Reference	Murli, H. 1988. Mutagenicity test on [trade name deleted; glycerol ester of rosin] in an in vitro cytogenetic assay measuring chromosomal aberration frequencies in Chinese hamster ovary (CHO) cells. HLA Study No. 10349-0-437. Hazleton Laboratories America, Inc., Kensington, Maryland.

IN VITRO GENETIC TOXICITY	
Test substance	
Chemical Name	Rosin, glycerol ester
CAS #	8050-31-5
Method	
Method/Guideline followed	Test was consistent with OECD Test Method 482, *"DNA Damage and Repair, Unscheduled DNA Synthesis in Mammalian Cells in Vitro"*
Year	1988
GLP (Y/N)	Y
System of testing	Rat primary hepatocytes
Concentration	5.08 to 102 μg/mL
Metabolic activation	With and without
Results	Non-mutagenic
/Detailed Summary	Glycerol ester of rosin (CAS #8050-31-5) was incubated with rat

	primary hepatocytes. The hepatocytes were allowed to attach to the culture dish for 1.5 to 2 hours after which cells were exposed to the test article along with ^{3}H-thymidine for 18 to 19 hours. The cultures were washed and cell counts were taken. The labeled cells were fixed, dried, and developed for microscopic examination. One hundred fifty cells from each treatment group were examined. Concentrations ranging from 5.08 to 102 µg/mL were examined for unscheduled DNA synthesis. Both positive and negative controls were used. No evidence of unscheduled DNA synthesis was observed. Glycerol ester of rosin was negative in this assay.
Data Quality	Valid without restriction – Klimisch Code 1a
Reference	Cifone, M.A. 1988. Mutagenicity test on [trade name deleted; glycerol ester of rosin] in the rat primary hepatocyte unscheduled DNA synthesis assay. HLA Study No. 10349-0-447. Hazleton Laboratories America, Inc., Kensington, Maryland.

IN VITRO GENETIC TOXICITY	
Test substance	
Chemical Name	Rosin, partially hydrogenated methyl ester
CAS #	8050-15-5
Method	
Method/Guideline followed	OECD Test Method 471, *"Bacterial Reverse Mutation Test"*
Year	2001
GLP (Y/N)	Y
System of testing	*S. typhimurium* strains TA98, TA100, TA1535 and TA1537 *E. coli* WP2*uvr*A
Concentration	17, 50, 167, 500, 1667, and 5000 µg/plate
Metabolic activation	With and without addition of S-9 fraction from Aroclor 1254 treated Sprague-Dawley rats.
Results	Non-mutagenic with or without metabolic activation
Detailed Summary	Rosin, partially hydrogenated methyl ester was tested in *S. typhimurium* strains TA98, TA100, TA102, TA1535 and TA1537 and *E. coli* WP2*uvr*A for mutagenic activity. The test article was tested at concentrations of 17, 50, 167, 500, 1667, and 5000 µg/plate with and without metabolic activation with S9 fraction from Aroclor 1254-treated adult male Fisher rats. Positive controls not requiring metabolic activation included N-ethyl-N-nitro-N-nitrosoguanidine (EENG), 9-aminoacridine, 2-nitrofluorene, and sodium azide; the positive control requiring metabolic activation was 2-aminoanthracene. No increases in mutation frequency were reported at any concentration of rosin, partially hydrogenated methyl ester with or without metabolic activation. Rosin, partially hydrogenated methyl ester was not mutagenic in this assay to *S. thyphimurium* or *E. coli* either with or without metabolic activation to a maximum limit of 5000 µg/plate.

Data Quality	Valid without restriction – Klimisch Code 1a
Reference	Stevenson, F.M. 2001. Rosin, partially hydrogenated methyl ester, CAS No. 8050-15-5 Testing for Mutagenic Activity with *Salmonella Typhimurium* TA 1535, TA 1537, TA 98 and TA 100 and *Escherichia coli* WP2*uvr*A. Report No. 20337. Inveresk Research, Tranent, Scotland.

IN VITRO GENETIC TOXICITY	
Test substance	
Chemical Name	Rosin, partially hydrogenated methyl ester
CAS #	8050-15-5
Method	
Method/Guideline followed	OECD Test Method 473, *"Chromosomal Aberration Assay with Chinese Hamster Ovary Cells in vitro."*
Year	2001
GLP (Y/N)	Y
System of testing	Chinese Hamster Ovary (CHO) cells *in vitro*
Concentrations of test material selected for assessment of chromosomal aberrations	Test 1: With S9 mix: 10, 20 and 30 ug/ml Test 2: With S9 mix: 5, 10 and 20 ug/ml Test 1: Without S9 mix: 2.5, 5, and 10 ug/ml Test 2: Without S9 mix: 12.5, 15 and 17.5 ug/ml
Metabolic activation	With and without addition of S9 fraction from Aroclor 1254-treated adult male Fisher rats.
Results	Non-clastogenic with or without metabolic activation.
Detailed Summary	Rosin, partially hydrogenated methyl ester was tested in Chinese hamster ovary (CHO) cells for clastogenic activity both with and with metabolic activation with rat liver S9 mix. The test article was tested with metabolic activation with S9 mix at concentrations of 1.25, 2.5, 5, 10, 20, 30, and 40 ug/ml (Test 1) and in Test 2 at 5, 10, 20, 30, and 40 ug/ml with S9 mix and without metabolic activation with S9 mix at concentrations of 2.5, 5, 10, 12.5, 15, 17.5, and 20 ug/ml. The positive controls requiring and not requiring metabolic activation were cyclophosphamide (CPH) and methanesulphonate (MMS), respectively. Treatments with test item or controls were performed on duplicate cell cultures. Two slides per culture up to 50 metaphase cells per slide were examined. A dose level was considered to be toxic if the cell count was reduced to less than 50% of the mean vehicle control values or if consistent evidence of changes to cell morphology was observed. It was concluded that rosin, partially hydrogenated methyl ester was not clastogenic in CHO cells *in vitro* in the presence or absence of S9 mix.
Data Quality	Valid without restriction – Klimisch Code 1a
Reference	Murie, E. 2001. Rosin, partially hydrogenated methyl ester, CAS No. 8050-15-5 Chromosomal Aberration Assay with Chinese Hamster Ovary Cells in vitro (Complying with EC (Annex V) and OECD 473 Guidelines). Report Number 20718. Inveresk Research, Tranent, Scotland.